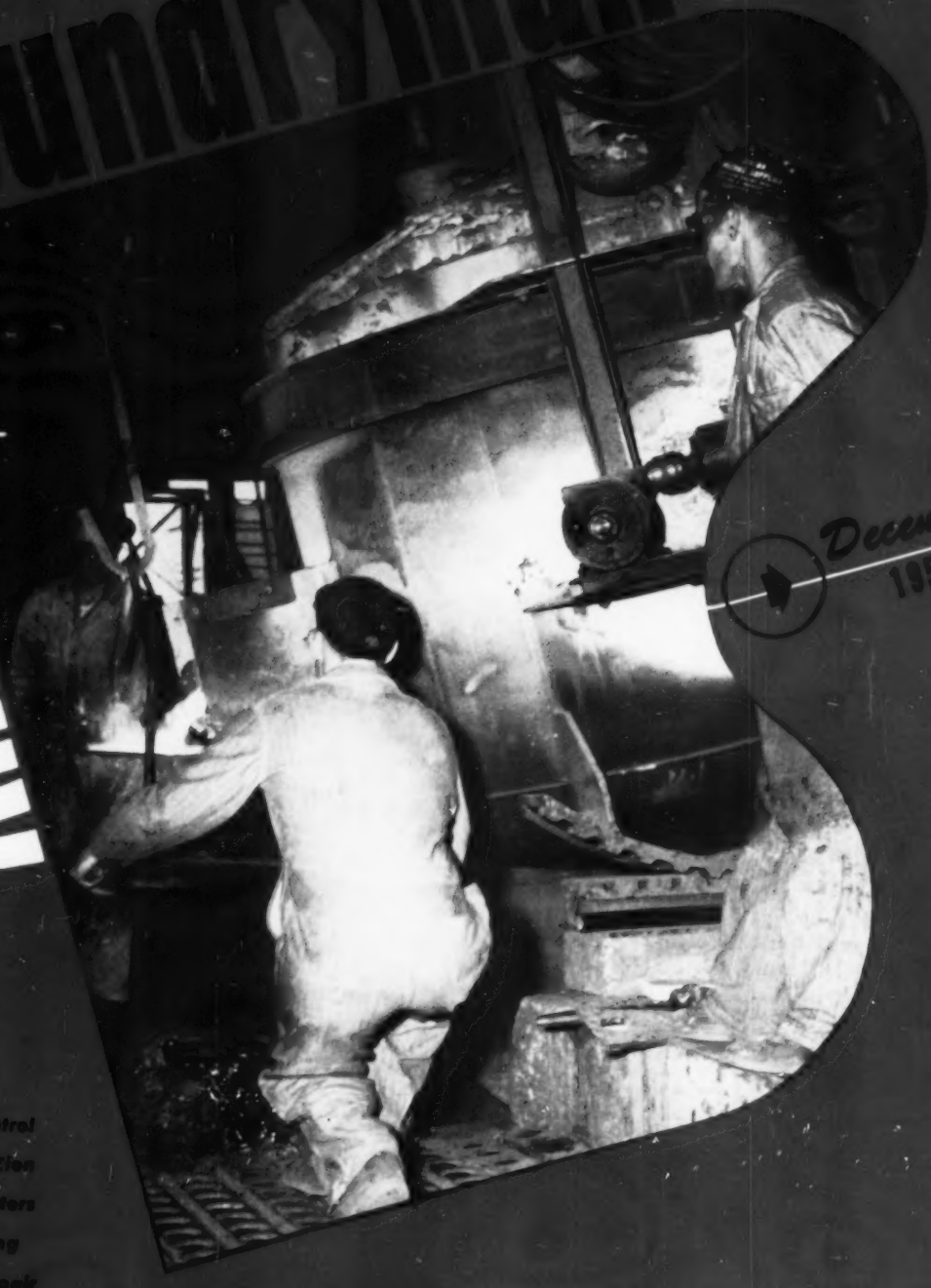
The Foundryman's Own Magazine

American Foundryman



December 1953

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Their *Lectromelt** Furnace gives them

3 Extra Heats a Day...

A CQT Lectromelt Furnace keeps right up with the foundry at Omaha Steel Works operating at 25% to 30% over capacity for which it was designed.

At Omaha Steel they laid out the foundry to produce five heats per day. Then, they proceeded to operate at 25% to 30% over capacity. Their Lectromelt Furnace keeps pace with above-capacity production, averaging eight heats per day.

Lectromelt Furnaces are known for their ability to take on extra work when you must meet demanding schedules. Even when handling higher power loads and while turning out extra tonnage, a Lectromelt still gives trouble-free performance.

Metals melting is easier and more profitable when you use Lectromelt Furnaces because additional ruggedness and dependability are engineered into each furnace while it's in the design stage. You get a sturdy furnace with these added advantages:

1. Precise temperature and analysis control.
2. Top-charging to save man-hours, power, electrodes and furnace lining.
3. Power supply and regulation equipment specifically engineered and built to fit each installation.
4. Counterbalanced electrode arms.
5. Separately mounted roof lift and swing mechanism.
6. Side-mounted tilting mechanism.
7. Each furnace is assembled in our factory prior to delivery.

Write for our catalog No. 9. It describes all types of Lectromelt Melting Furnaces and their operation. Pittsburgh Lectromelt Furnace Corporation, 316 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*

HERE'S ALL YOU NEED

for easier, better sand control

Yes, these three additives, mixed in your regular heap or system sand, will provide the precise sand characteristics needed for your work. FEDERAL GREEN BOND for desired sand strength. CROWN HILL SEACOAL for carbon content. FEDERAL SAND STABILIZER for flowability. And of the three, FEDERAL STABILIZER can be the one factor to really *"balance out"* your sand to obtain hoped-for results. STABILIZER definitely provides better flowability so green strength can be run higher—makes for easier ramming to insure more uniform mold hardness—allows a wider range of safe moisture content. STABILIZER induces molds to take dry or wet coatings more readily, with deeper penetration—and minimizes lumpy shakeout to permit maximum sand reclamation.

In addition to obtaining better results, you also get low-cost sand preparation with these additives—because they will actually cost you *less than $1.00 per ton of castings produced!*

We have a new bulletin giving full particulars. Write for YOUR copy—today!

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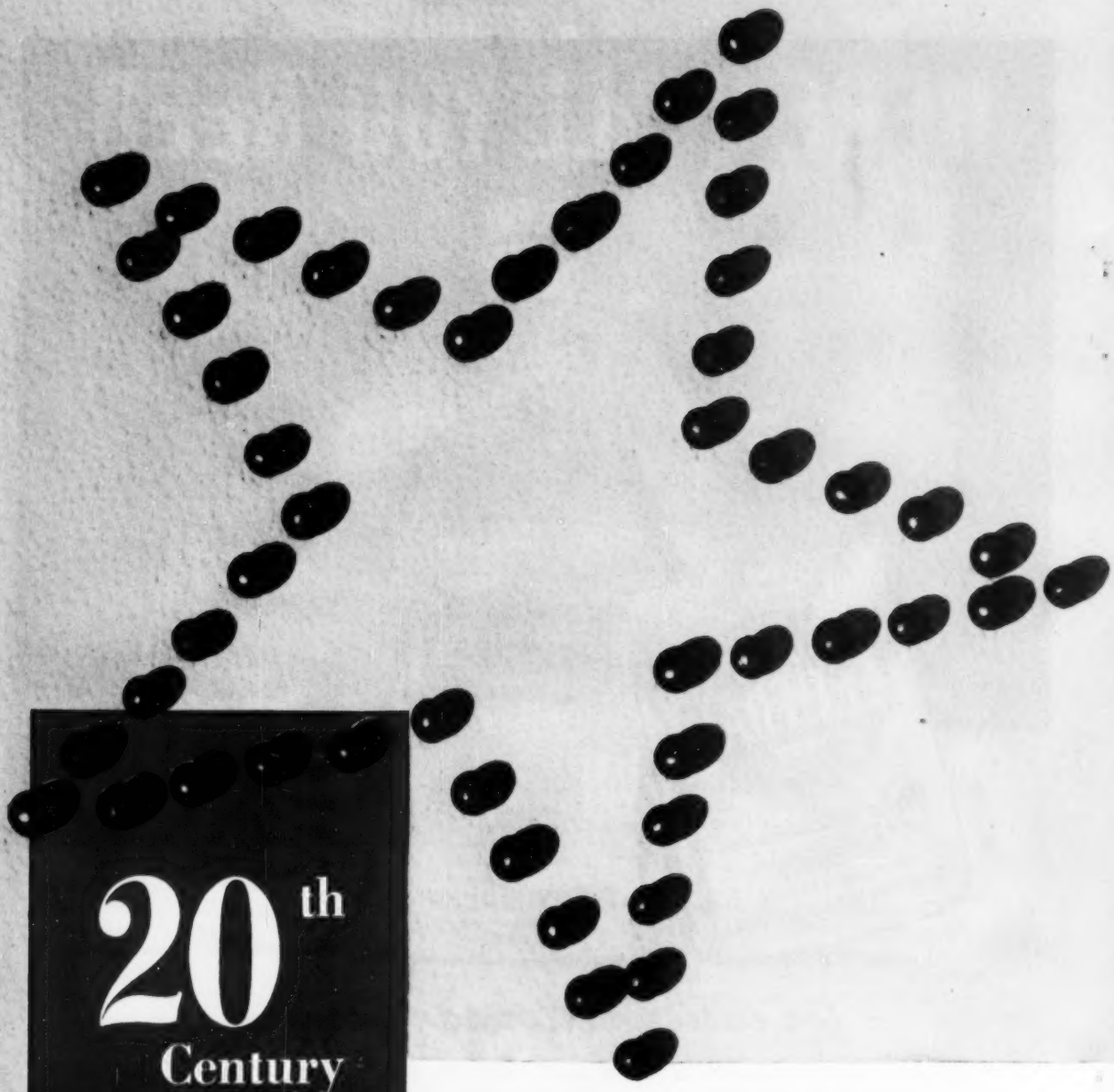
The **FEDERAL FOUNDRY SUPPLY** *Company*

4800 EAST 71st STREET, CLEVELAND 5, OHIO

CROWN HILL, W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND, VA. • ST. LOUIS • CHATTANOOGA • NEW YORK • UPTON, WYO.



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the persuasive abrasive

Looking for a Star Performer?

20th Century* Normalized shot and grit will guarantee you top performance on four scores:

(1) Uniformity
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(3) Economy
(4) Quality

A malleable abrasive, it's being used in foundries and metalworking plants everywhere.

Our new catalog is yours for the askina.

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THE CLEVELAND Metal Abrasive CO.

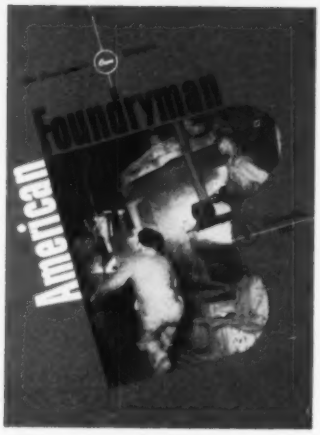
801 East 67th Street Cleveland 8, Ohio
Howell Works: Howell, Michigan

One of the world's largest producers of *quality* shot, grit and powder
—Normalized—Hard Iron—Cut Wire

American Foundryman

Volume 24 **December 1953** *Number 6*

Published by American Foundrymen's Society



Our cover shows how a small steel foundry can look less than two years after starting from scratch. The story of Spokane Steel Foundry in the January issue of AMERICAN FOUNDRYMAN will give you a full report.

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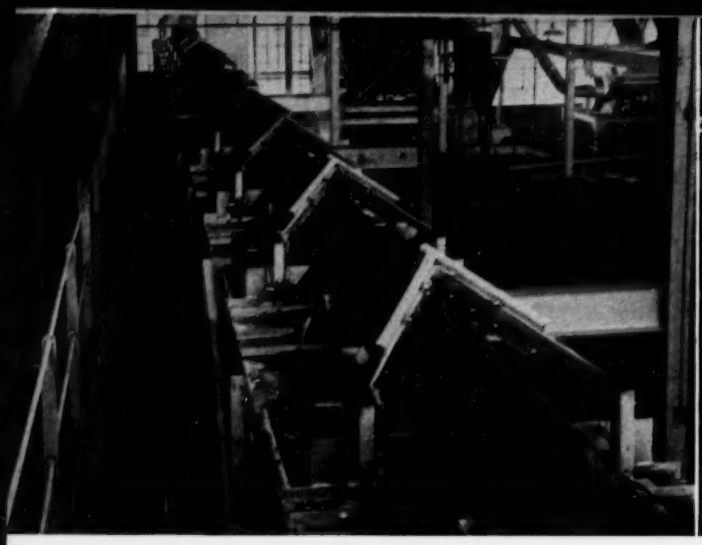

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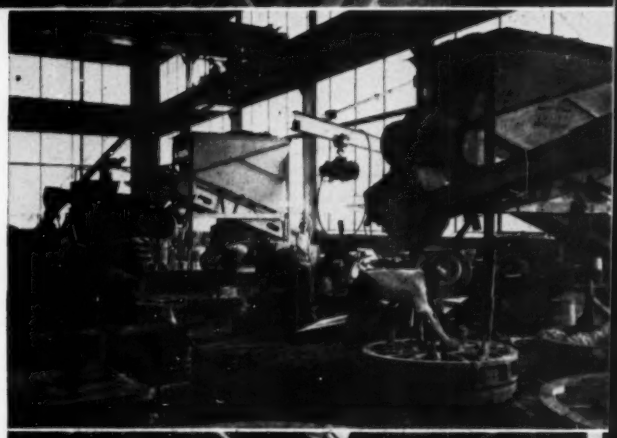

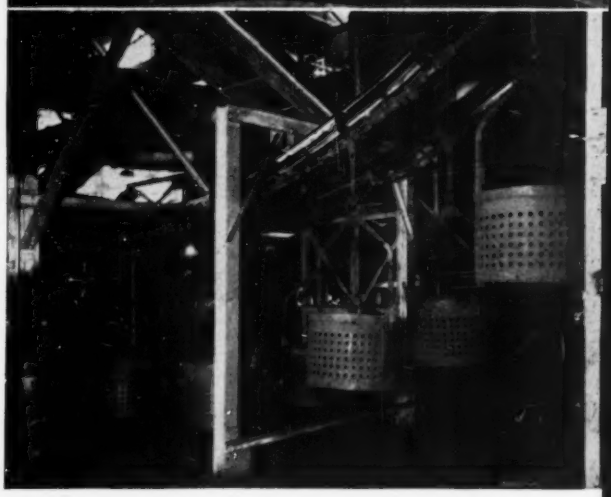

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THE JEFFREY MANUFACTURING CO.

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Columbus 16, Ohio

sales offices and distributors in principal cities

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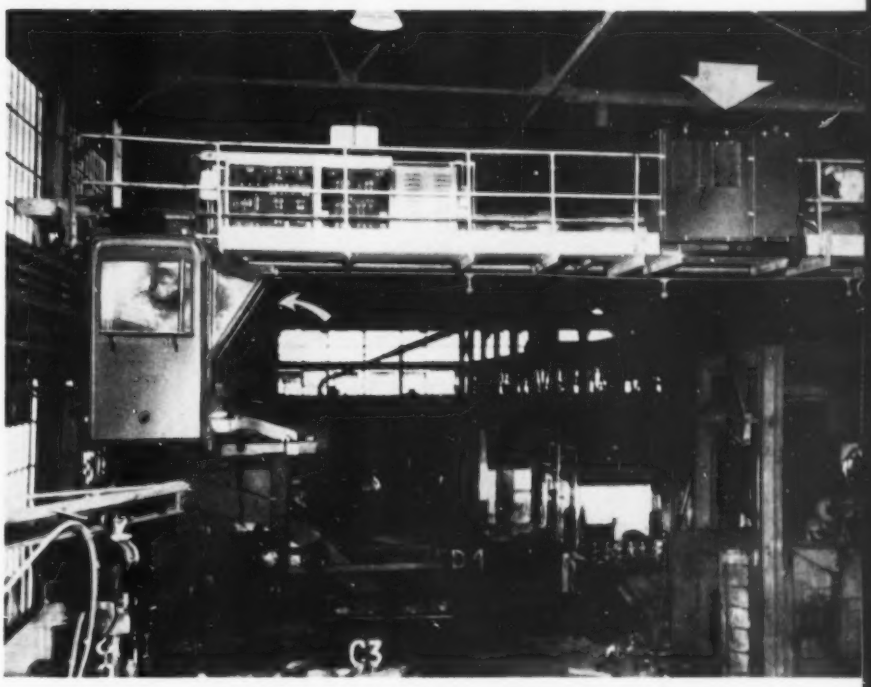
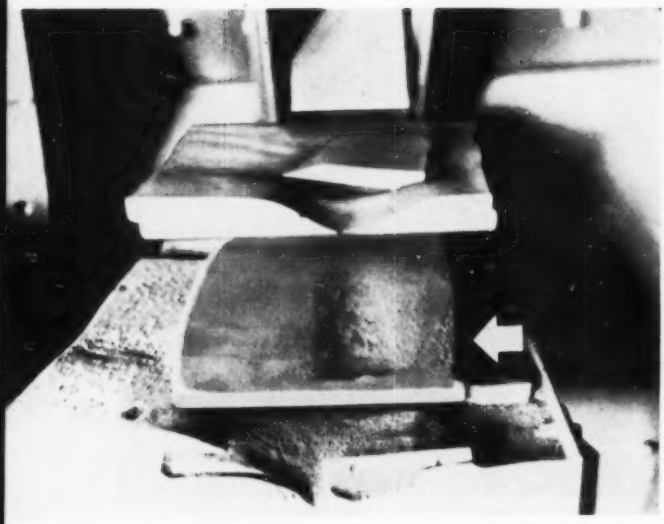
IF IT'S MINED, PROCESSED OR MOVED
. . .IT'S A JOB FOR JEFFREY!

Here's How...

• • • Duncan Foundry and Machine Works, Inc., Alton, Ill., is air-conditioning the cabs on its crane. Because of low head room, the crane cab is low and exposed to intense heat, smoke, and fumes. A Lintern Air-Rectifier, located on crane (large arow), is connected to unit in cab (small arrow) by refrigerant lines. Cranes located in pouring, shake-out, and annealing areas are thus air-conditioned, resulting in bettter working conditions and increased production efficiency, reports the foundry.

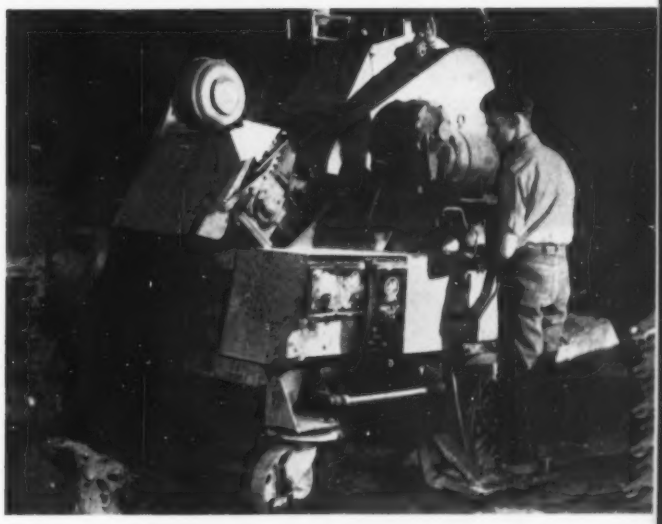
For more data, circle No. 28, p. 17





• • • Bridgewater Foundry, Bridgewater, Mass., uses a ¾-in. thick sheet of "Iron-Rubber" inside a large Wheelabrator to combat abrasion and corrosion. Made either in reinforced or non-reinforced types, material is guaranteed by manufacturer to outlast the material it protects many times over.

For more data, circle No. 29, p. 17



• • • the Charlotte Pipe and Foundry Co., Charlotte, N. C., uses an Eriez magnetic pulley on their Royer sand conditioner to remove up to 14,000 lb of tramp iron a week from used mold sand. The magnetic pulleys operate through belts of rubber, leather, canvas, stainless steel, or other non-magnetic material.

For more data, circle No. 30, p. 17

Iron foundry doubles output with no extra manpower

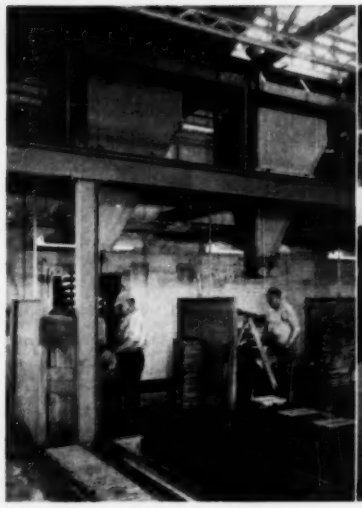
American Hardware also has LINK-BELT mechanize sand handling in its brass foundry

RECENTLY, the American Hardware Corp. modernized one-half of their New Britain (Conn.) iron foundry, producing building hardware products for their P & F Corbin, Russell & Erwin, and Corbin Cabinet Lock divisions. This conversion provided a unique chance to compare mechanized and hand-labor methods. The converted half, with its Link-Belt sand handling and reconditioning system, has doubled production with no increase in manpower.

Later a 70-ft., Positive Action Link-Belt Oscillating Conveyor was added to sprue castings from gates. Result: handling costs cut more than 50%.

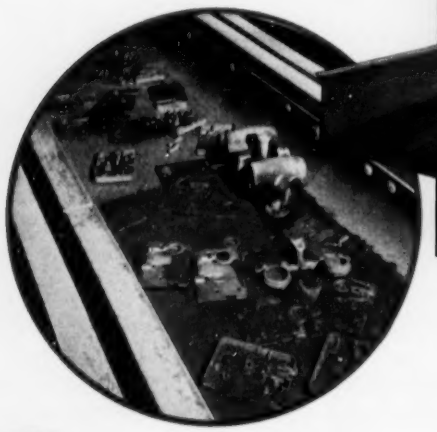
Naturally, when the American Hardware Corp. management decided to mechanize their brass foundry, Link-Belt sand handling and reconditioning equipment was chosen. And again, better working conditions, lower costs and improved casting quality are the result.

Link-Belt's engineering experience and efficient foundry equipment can provide equally striking benefits for you. Our engineers will work hand-in-hand with you and your consultants.



Link-Belt belt conveyors distribute sand to molders' hoppers, recover spillage as it falls through grates.

Shakeout and spill sand is delivered to Link-Belt vibrating screen by bucket elevator shown in background.



Link-Belt Oscillating Conveyor, spring-mounted to minimize floor vibration, discharges sprued iron castings to tote boxes. Note how effectively perforated section screens out molding sand shaken loose from castings (inset).

LINK-BELT

CONVEYORS and PREPARATION MACHINERY

MEMBER FEMA

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 13.282

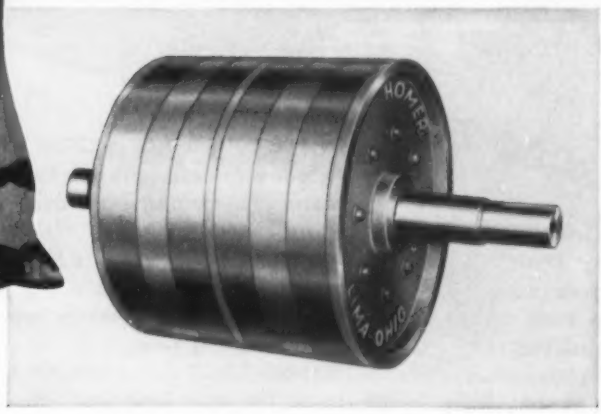
We're Interested...

in your Tramp iron problems!

Yes—we're interested in helping you cut costs, improve your production and your finished products. We're interested in helping you eliminate down-time and damaged equipment—in short, *we're interested in helping you get rid of your TRAMP IRON troubles!*

Regardless of how tramp iron affects your operations, it will pay you well to check production losses and maintenance costs which can be attributed directly to this source of trouble.

Homer maintains complete facilities for investigation and research into your magnetic separation problems. Homer maintains an efficient, nation wide staff of sales representatives, trained in magnetic protection procedure. We invite you to make use of our services. Competent recommendations made without obligation to you. The Homer Manufacturing Company, Inc., Dept. 249, Lima, Ohio.



Remember...

with a HOMER...you are

Certain!

HOMER

The HOMER non-electric magnetic pulley shown above is one of the largest permanent magnet pulleys ever built. It is 42" in diameter, with a belt width of 36". This Homer pulley is installed in a 200 foot long slope conveyor, handling Bauxite Ore up to 600 tons per hour, with a maximum belt speed of 300 feet per minute. Burden varies and at times runs to a depth of 8 inches.

CLEANSES IRON
REDUCES CASTING SCRAP

Famous
CORNELL CUPOLA FLUX

Approved

by leading gray iron foundries and malleable foundries with cupolas for more than 35 years

IN THE INTEREST OF BIGGER RETURNS FROM YOUR INVESTMENT it will pay you to follow the example of a long list of leading foundries who are guarding against casting rejects and make-overs by using Famous Cornell Cupola flux in each and every charge of iron.

When your cupola is tapped you get clean and more fluid iron. Sulphur is amazingly low — and many times it is reduced to practically nil. And your cupola operation is greatly improved, due to cleaner drops and amazing freedom from bridging over.

SCORED BRICK FORM accurately measured for instant use, is another feature that saves the user time and labor.

Write for Bulletin No. 46-B

The Cleveland Flux Co.

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Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS FLUXES
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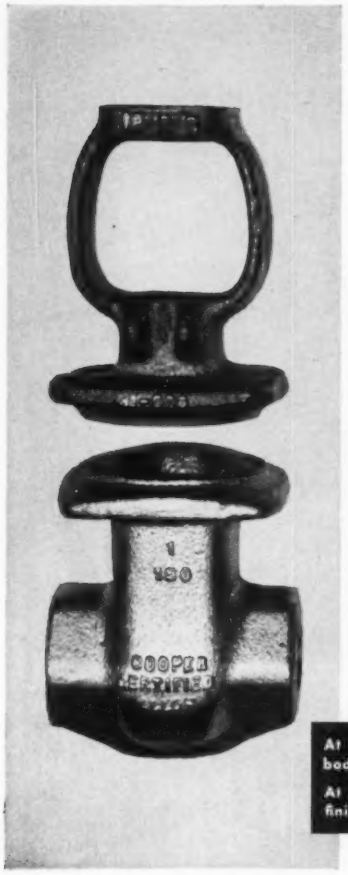
BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.



"Here's why COOPER ALLOY uses GENERAL ELECTRIC SHELL RESINS"

—says Morton L. Katz, Chief Shell Mold Engineer, Cooper Alloy Foundry Co., Hillside, New Jersey

At left—conventional sand-molded stainless-steel valve bonnet and body.

At right—shell-molded bonnet and body. Notice superior surface finish and legibility of identification on shell-molded castings.

"General Electric resins are used extensively in our shell-molding operations because of their extremely high strength, good reproductivity and minimum reaction with molten stainless steel. By selecting proper resins, we are able to assure high productivity and superior quality."

This experience of a foundry that was "into" shell casting from the beginning is worth *your* consideration. The new shell process, offering smoother surface finish, better dimensional stability and greater yield per man-hour than conventional sand-casting methods, may mean important savings for you and your customers.

Ask G.E. about shell casting

General Electric offers you a "team" of products to help you get maximum benefits from shell casting. *G-E phenolic shell resins help* you make strong, dimensionally accurate sand shells with smooth surfaces and sharp contours. *SM-55 silicone parting agent* helps you obtain quick, easy release of shells from patterns. *Send the coupon today for free samples and technical data!*

You can put your confidence in—

GENERAL ELECTRIC

Send coupon today for more details!

General Electric Company
Section 317-1B, Chemical Division
Pittsfield, Massachusetts

Please send me:

Data	Sample	
( )	( )	G-E phenolic shell resin (medium cure)
( )	( )	G-E phenolic shell resin (fast cure)
( )	( )	SM-55 silicone parting agent

I want this for: ( ) Reference purposes only ( ) An immediate application on_____

Name_____

Firm_____

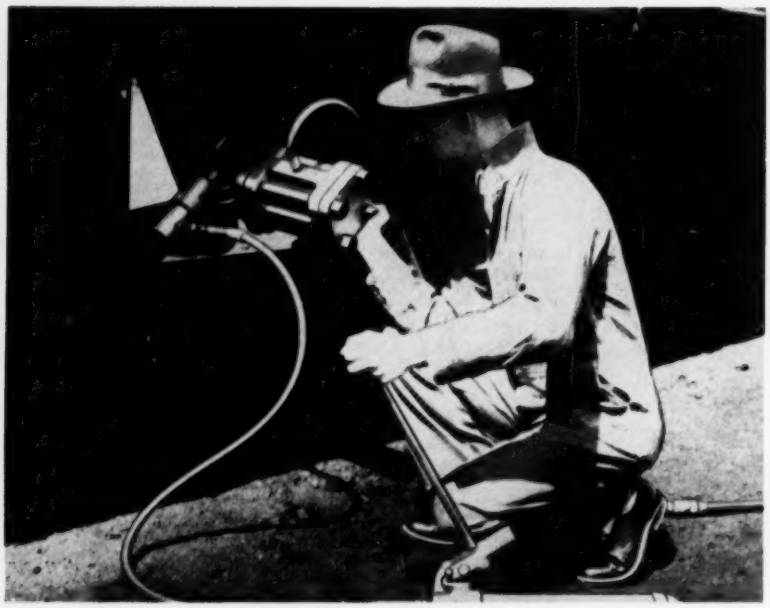
Street_____

City_____ Zone____ State_____

Products & Processes

For additional information,
use postcard at bottom of page 17

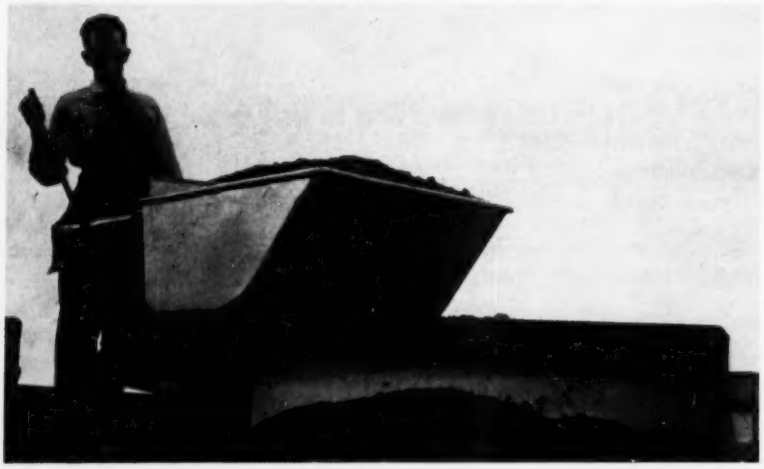
continued on page 12



Railroad Car Unloader

Here is a portable, powerful air vibrator that is easily attached to a railroad car or other material handling device for unloading. Has C-clamp head and cylinder, hand-operated push-pull pump and 6-foot hose assembly. Two men are said to unload car of limestone in two minutes. *Cleveland Vibrator Co.*

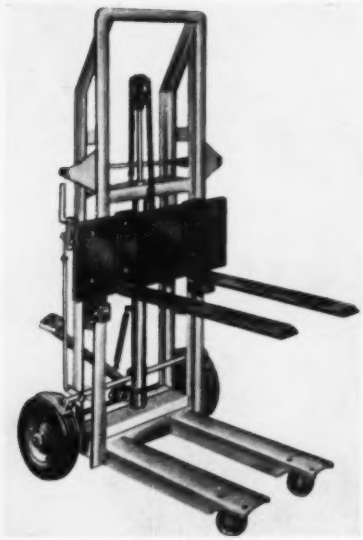
For more data, circle No. 31, p. 17



Materials Mover

This Prime-Mover is claimed to multiply man power three fold. Carries sand, castings, scrap, runs in narrow aisles, inside or out. *Prime-Mover Co.*

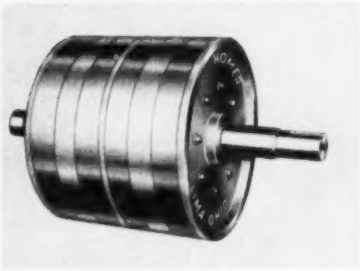
For more data, circle No. 32, p. 17



Portable Lift Truck

New, portable, one-man truck is reputed to lift 1000 lb to 53 in. *Industrial Eqpt. Corp.*

For more data, circle No. 33, p. 17



Magnetic Pulley

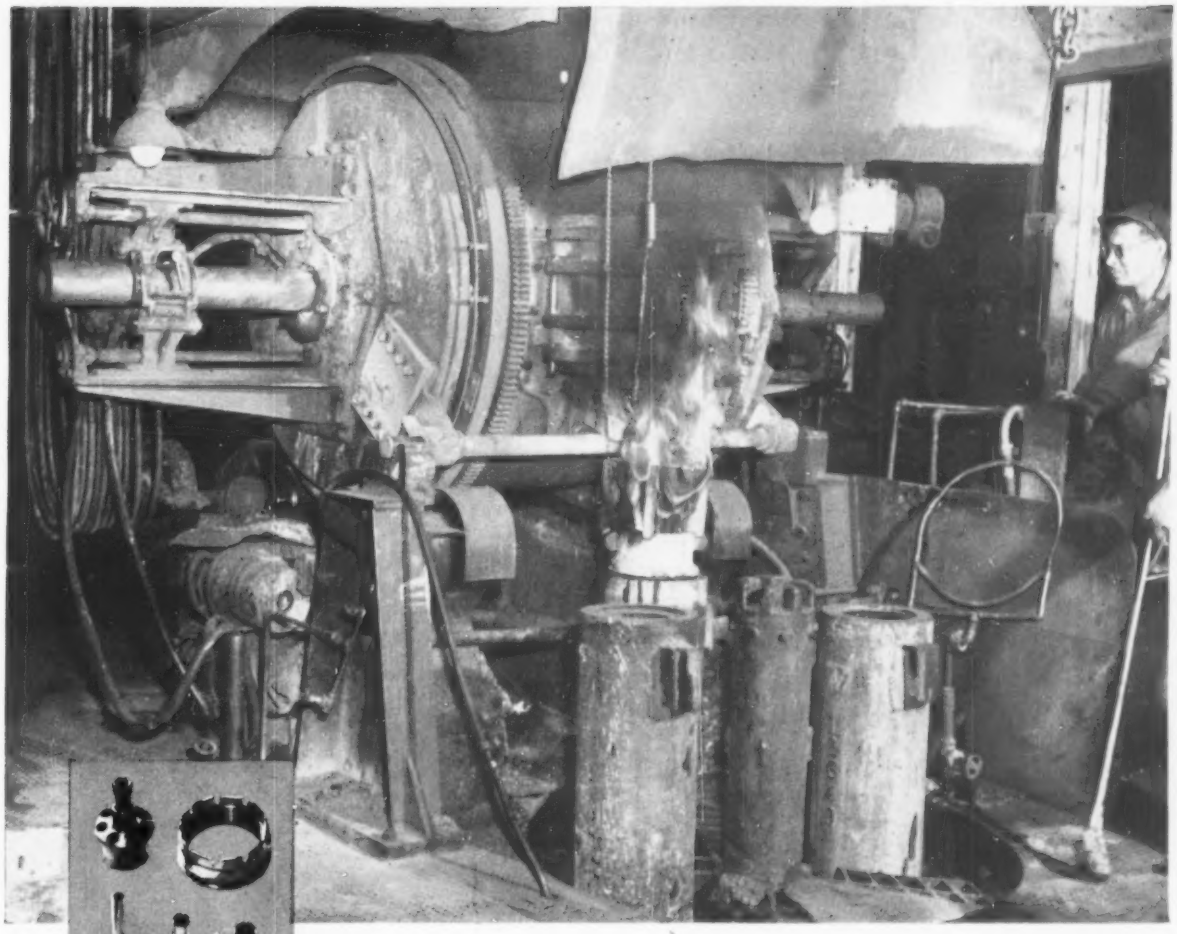
One of most powerful Alnico pulleys, designed for heavy loads. *Homer Mfg.*

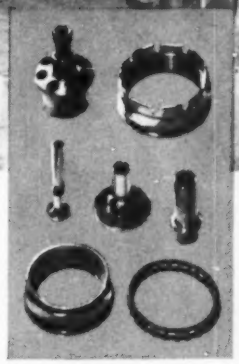
For more data, circle No. 34, p. 17

Versatile Lifter

Many new features of this 2000-lb electric truck available. *Elwell-Parker.*

For more data, circle No. 35, p. 17





Some of Mueller Brass Company's products made from DEF-melted alloys.

11 tons of copper alloy billets from this furnace every 24 hours

In this nose-tilting, 1000-lb. capacity Detroit Rocking Electric Furnace at Mueller Brass Company, alloys are changed from heat to heat. Yet it melts and pours about 11 tons of billets every 24 hours.

It's a good example of the versatility and fast-melting characteristics of Detroit Rocking Electric Furnaces. Each heat produces a billet of precisely controlled analysis. Rocking action of the furnace makes most efficient use of the heat from the in-direct arc, guarantees homogeneity of metal. High quality metal means fewer rejects, better products.

Detroit Electric Furnaces, in capacities from 10 to 8000 lbs., are outstanding producers for both ferrous and non-ferrous metals. Outline your requirements and we'll give you complete information to bring new efficiency to your metal melting. Write today!

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

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Products & Processes

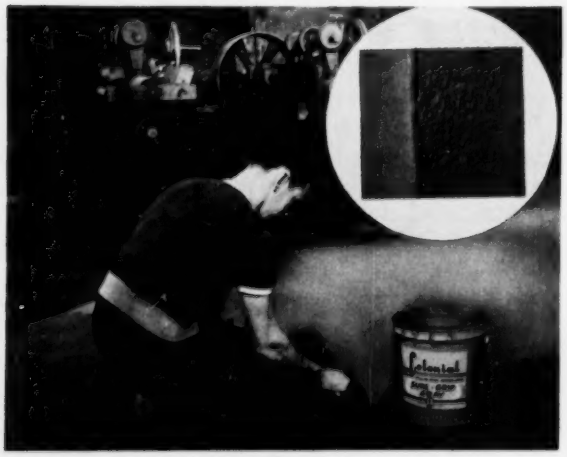
For additional information, use postcard at bottom of page 17

(continued on page 17)

Pressure Testing Machine

Vertical pressure testing machine that is designed to detect and locate leaks in castings. *Hautau Eng. Co.*

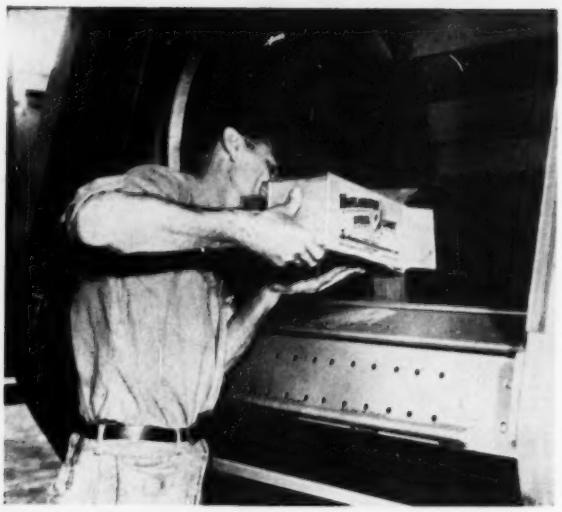
For more data, circle No. 36, p. 17



Anti-Slip Paint

Manufacturer says this paint will safety-proof all industrial floors with non-slip, non-skid covering. Brushed on in one coat, no primer. *Colonial Refining & Chem. Co.*

For more data, circle No. 37, p. 17



New Shot Packaging

Improved packaging method for shipping steel shot is announced. New 50-lb fiber board cartons replace former bags, are now made on disposable pallets holding one ton of shot each. Palletization is now performed without additional charge. Cartons said to be stronger, resist puncture better, and to be waterproof. Only half weight of conventional bag, cartons make charging of blast machine easier. Shipping losses minimized. *American Wheelabrator & Eqpt. Corp.*

For more data, circle No. 38, p. 17

Shell Molding Machine

Model HO-4 Shalco shell molding machine features dual dump boxes and choice of gas or electric curing oven. It is claimed to incorporate new features designed to increase output and uniformity of molds. Designed by manufacturer to make precision shell molding available at cost within range of all foundries. Reported to produce up to two shells per minute, unit is available with automatic timers for both inversion and curing cycles. Use of ball bearings mounted, hinged pattern aids positive alignment for precise shell duplication. *Shalco Engineering Corp.*

For more data, circle No. 39, p. 17

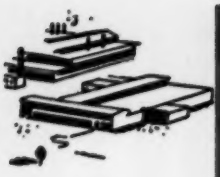
PENN SAND

SILICA FLOUR

it makes sense . . . use the best AT NO EXTRA COST

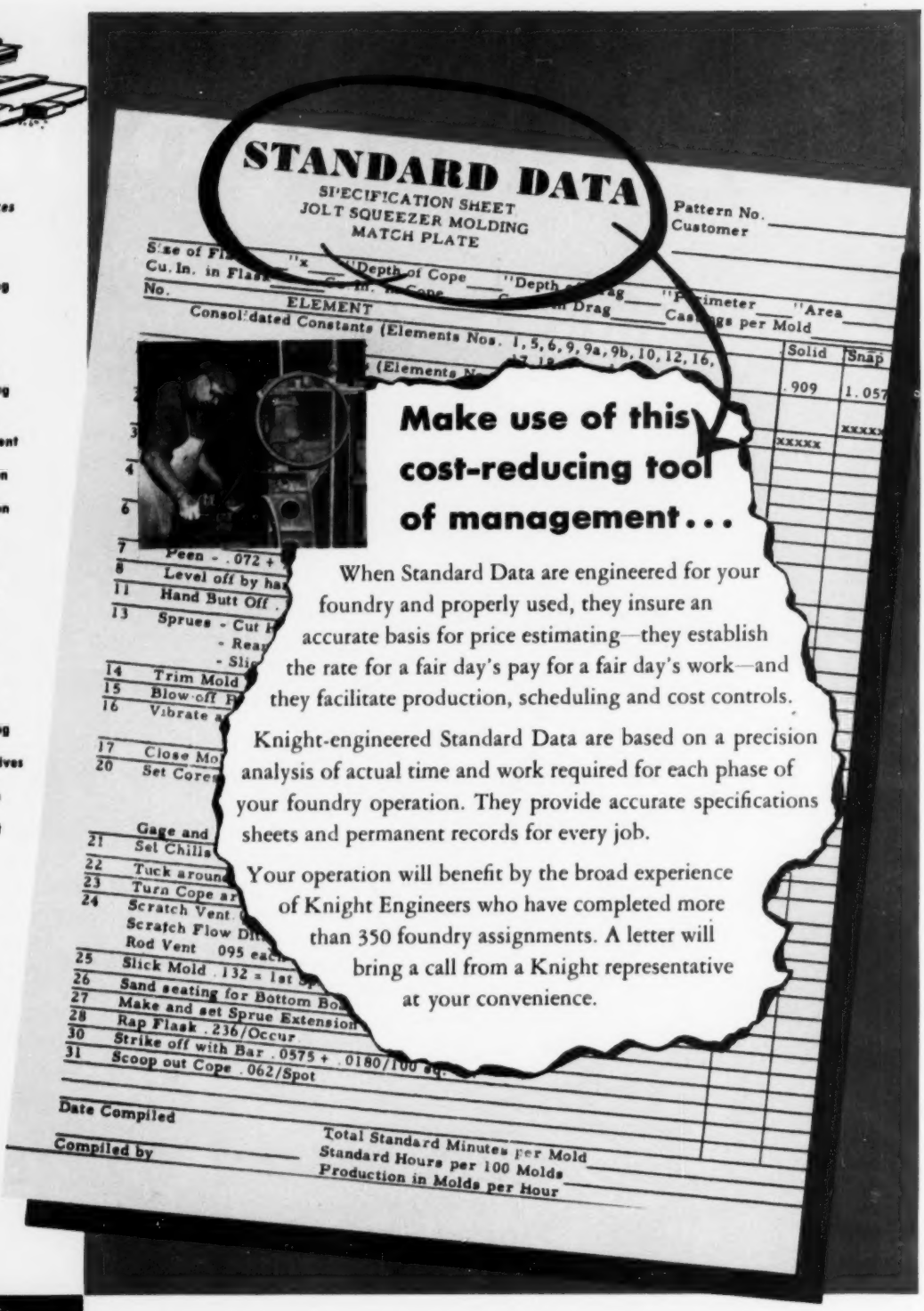
The excellent refractoriness of Penn Sand Silica Flour reduces metal penetration, minimizes surface defects and produces castings of exceptionally smooth finish. In your mold wash, you will find that constantly uniform Penn Sand Silica Flour gives the same suspension and thickness of application every time; you always get the same even coating. ● Its high fusion point and perfect uniformity also make Penn Sand Silica Flour ideally suited as an admixture to your mold and core sands. Supplied by the country's leading producer of quality silica products, Penn Sand Silica Flour is available for immediate shipment to you in a complete range of grades. ● It makes sense to use the best silica flour when it costs no more. Write today for free samples—and on your next order be sure to specify Penn Sand Silica Flour, the most economical material for mold wash.

PENNSYLVANIA PULVERIZING COMPANY
subsidiary of PENNSYLVANIA GLASS SAND CORPORATION
producers of
MOLDING SAND • CORE SAND • SHELL-MOLDING SAND • SANDBLAST SAND
General Sales Offices: GATEWAY CENTER, PITTSBURGH, PA. • Eastern Sales Office: TRENTON TRUST BLDG., TRENTON, N. J.



Knight Services Include:

- Foundry Engineering
- Survey of Facilities
- Architectural Engineering
- Construction Management
- Modernization
- Mechanization
- Automation
- Materials Handling
- Production Control
- Cost Control
- Industrial Engineering
- Wage Incentives
- Organization
- Management


STANDARD DATA
SPECIFICATION SHEET
JOLT SQUEEZER MOLDING
MATCH PLATE
Pattern No.
Customer
Make use of this cost-reducing tool of management...
When Standard Data are engineered for your foundry and properly used, they insure an accurate basis for price estimating—they establish the rate for a fair day's pay for a fair day's work—and they facilitate production, scheduling and cost controls.
Knight-engineered Standard Data are based on a precision analysis of actual time and work required for each phase of your foundry operation. They provide accurate specifications sheets and permanent records for every job.
Your operation will benefit by the broad experience of Knight Engineers who have completed more than 350 foundry assignments. A letter will bring a call from a Knight representative at your convenience.
Date Compiled
Compiled by
Total Standard Minutes per Mold
Standard Hours per 100 Molds
Production in Molds per Hour

EVIDENCE OF EXPERIENCE

Lester B. Knight & Associates, Inc.

Consulting Engineers

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC

600 W. Jackson Blvd., Chicago 6

917 Fifteenth St., N. W., Washington 5, D. C. • Lester B. Knight & Associates, 50 Church St., New York 7

Core Drying Time CUT 91%

Core measures 10 inches in diameter, 3 inches high, 2 inches thick at base.

OLD TIME—70 minutes *in conventional oven*

NOW—6 minutes *in dielectric dryer*

Fast drying is a big story, but it is not the whole story! When this core comes out of the dryer, it is cool, dry, and ready to go right to the molder. This means cores can be made only as they're needed. In many foundries hundreds of square feet of valuable floor space can be converted from core storage to productive area, by changing to *Foundromatic* core dryers.

And in addition, they give you these benefits:

- **Complete elimination of overbaking or burning of cores — even cores with thin sections.**
- **Good core finish.**
- **Easy shakeout.**
- **Fuel savings up to 60%.**

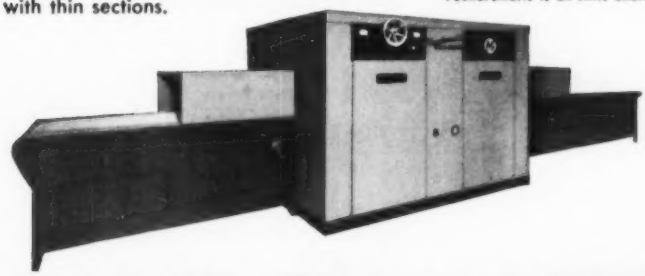
IMPROVED DESIGN

Now, new higher capacity, new compact design makes the latest *Foundromatic* core dryer a better investment than ever. Core drying capacity is increased as much as ⅓ (in the 25-kw size).

Call your nearby A-C district office for complete specifications. Or write Allis-Chalmers, Milwaukee 1, Wis.

Foundromatic is an Allis-Chalmers trademark.

A-4097



ALLIS-CHALMERS

FOUNDROMATIC
SAND CORE DRYER

QUESTIONS and ANSWERS

About Dielectric Sand Core Drying

1. What dollar savings can I expect with the Foundromatic *core dryer?*
Savings estimates of 55% to 70% have been reported.

2. Can metal dryers be used?
Yes, metal dryers can now be used with no loss of production in specific applications.

3. Is auxiliary heat needed to cure cores on metal plates?
No! By providing an insulating or non-metallic material between the core and the metal plate, cores may be cured without auxiliary heat.

4. How large a core can be dried?
Cores that will pass through an aperture 36 inches wide and 13 inches high can be dried. One foundry is drying a core weighing 950 pounds in the *Foundromatic* dryer.

5. Fuel savings of 60% are mentioned. How is this possible?
The dielectric heater delivers no power unless there is actually material between the electrodes. This means all the heat goes into the core. This makes for comfortable working conditions, too.

Allis-Chalmers
Milwaukee 1, Wisconsin

Please send me specifications on the improved *Foundromatic* sand core dryer.

Name .....

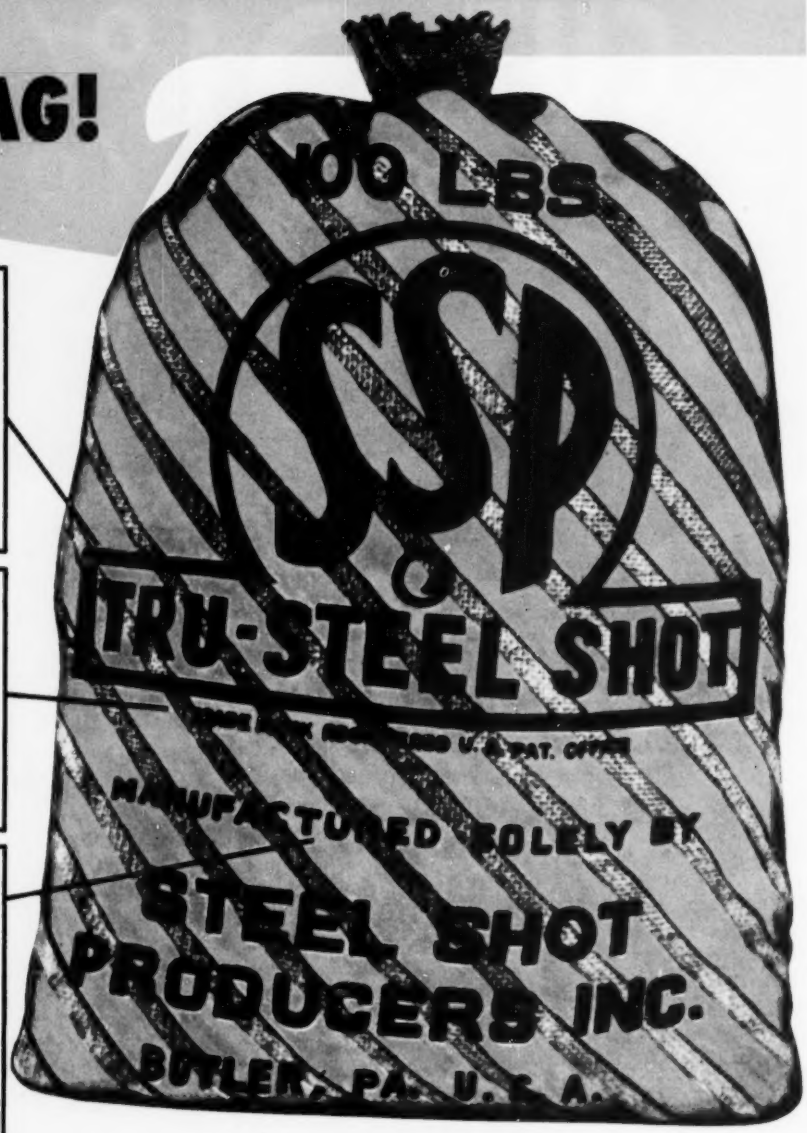
Title .....

Company .....

Street .....

City ..... State A-4097

THE "TRU-STEEL" STORY *is in the* BAG!



Tru-Steel is not just the name of an abrasive. It means TRUE STEEL . . . high-carbon steel shot of tool steel caliber, heat treated by a special process for durability. And five years of use in actual production have *proved* that Tru-Steel cuts costs by cleaning thoroughly, lasting longer!

This registered trademark is your assurance that the shot in this bag gives you unmatched quality. A continuous program of research combined with constant production supervision maintains Tru-Steel's exacting standards for a consistent, quality shot.

Only one plant in the country —STEEL SHOT PRODUCERS, Butler, Pennsylvania—makes Tru-Steel Shot. Backed by 60 years experience in metal abrasives, it is the *original* quality steel shot. Contact the Pangborn engineer in *your* locality. He will be glad to show you how Tru-Steel can help solve your cleaning problem.

For top-quality cleaning, order top-quality Tru-Steel Shot from Pangborn Corp., 1300 Pangborn Blvd., Hagerstown, Md.

Pangborn

DISTRIBUTORS FOR

TRU-STEEL SHOT

Look to Pangborn for the right abrasive for every blast cleaning job.

Products & Processes

Fill out postcard below for complete information on products listed in these pages.

Continued from page 12

CONVENIENT FORM FOR ORDERING INFORMATION

Film Badge Service

A new type film badge service for use when handling gamma radiation sources is available at low cost. Using a minimum of bookkeeping and mailing, the service offers film badges in lots of 20 to 500 for use only as needed. Results are reported by postcard, after being recorded on badges, which remain on file. *Technical Operations, Inc.*

For more data, circle No. 40 on card

Industrial Photo Tools

High-speed and time-lapse photography are now offered as industrial research and development tools by a consulting firm. Speed process can "slow down" time by factor as large as 200, expanding one second into three minutes, says the organization. Time-lapse is useful in study of corrosion, crystal growth, sedimentation rates, emulsification, and other slowly evolving processes. *Sam Tour & Co., Inc.*

For more data, circle No. 41 on card

Fire-Proof Paint

Easily applied to all interior walls and ceiling areas by brush or spray, this fire retardant paint is claimed to actually stop fire from spreading. Washable, flat wall paint, it withstands more than 25 cycles of scrubbing with strong washing powder and boiling water, according to manufacturer. Passed by Underwriters Laboratories. *Fyr-Kote Co.*

For more data, circle No. 42 on card

New Cut Wire Shot

High grade wire cut to form cylinders with length equal to diameter of wire, this shot is reputed to be uniform in size and hardness abrasive. For application in peening, tumbling, cutting, abrading. Said to stand up under thousands of impacts, using only fraction of quantity of abrasive previously required, and to outlast any cast or heat-treated shot. Costs are thus said to be lower for abrasive, labor, maintenance, machine time, handling and storage. *Metals Disintegrating Co.*

For more data, circle No. 43 on card

Pour Crucible Without Spillage

For plants needing faster than normal pouring rates, manufacturer offers crucibles with raised portion on lip side, about two inches high and half circumference of top. Pouring is asserted to be quickened on average of 40 per cent and spillage to be virtually eliminated with the new type crucible. Full details now available upon request. *Electro Refractories & Abrasives Corp.*

For more data, circle No. 44 on card

Epoxy Release Agent

Epoxy laminates and castings are said to be removed very readily from metal or plaster molds with new release agent —H-561-B. Plaster molds hardened and sealed with Plaspreg before applying release agent. Plaspreg is furane resin impregnating agent used for impregnating and hardening plaster forms. After application to mold surfaces, the release agent is ready for epoxy resins within few minutes. Claimed to be especially effective with low temperature setting, amine-hardening type of epoxy. Send for information on both products. *Furane Plastics, Inc.*

For more data, circle No. 45 on card

Reader Service Dept.

53|12

Please send me detailed information on the Products and Processes.

28	29	30	31	32	33
34	35	36	37	38	39
40	41	42	43	44	45
46	47	48	49	50	51
52	53	54	55		

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NAME

TITLE

COMPANY

ADDRESS

CITY AND ZONE

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 14680, Sec. 34.9 P. L. & R. CHICAGO, ILL.

Reader Service

AMERICAN FOUNDRYMAN

616 S. Michigan Avenue

Chicago 5, Illinois

Free Foundry Information

For additional information use postcard at bottom of this page

Blast Cleaning

Bulletin No. 1500 describes why blast cleaning is used, where it is used and how it is used. Well illustrated in color, it gives the background of blast cleaning, early stages, mechanized cleaning equipment, adoption of metal abrasive, application of centrifugal force and development of automatic equipment. Economics of blast cleaning are discussed and considerations involved in selection of proper category for the individual job. Blast cleaning applications, a partial list of articles being cleaned and a glossary are also included. *Pangborn Corp.*

For more data circle No. 46 on card

Silicones Guide

A new 1953-54 reference guide to silicone products is now available. The products themselves are described largely in terms of operating and service characteristics. The guide has a most thorough and comprehensive listing of silicone products. Fifteen new products, ranging from adhesives to molding compounds are included. New applications for silicone fluid are detailed and the performance of Silastic as a dielectric is also described. A cross-reference application index is also included in this latest reference guide. *Dow Corning Corp.*

For more data circle No. 47 on card

Refractories Manual

Leather covered spiral bound refractories pocket manual is now available. Included in the handbook is a list of standard sizes and of certain non-standard sizes in common use, with illustrations and dimensions; tables useful in determining quantities, and other essential information pertaining to refractories. *Harbison-Walker Refractories Co.*

For more data circle No. 48 on card

Pressure Cast Aluminum

A 16-page illustrated booklet "Accurate Aluminum Pressure Cast Products" is now available. Match plates, cope and drag plates, pattern castings, core boxes, dump, split and booked boxes, dryer patterns and other foundry items are described. Construction details and price information are also given. *Accurate Match Plate Co.*

For more data circle No. 49 on card

Shell Molding Machine

Four-page bulletin, 539-5, describes the advantages of the shell molding machine. Folder points out how machine can hold tolerances as close as .005 in. per in., thus eliminating or reducing subsequent machining costs. A step by step operation of the machine is illustrated in the bulletin. Folder also gives general specifications of the machine. *Shalco Engineering Corp.*

For more data circle No. 50 on card

Cooling Foundry Sand

Bulletin 500 describes three units for controlled moisture and cooling of foundry sand. The three units are: National Cooling Hood, National Moisture Master and National Water Injector. The National Cooling Hood is described more fully in a separate bulletin, which is available on request. *National Engineering Co.*

For more data circle No. 51 on card

Precision Casting

A free brochure entitled Precision Investment Casting is now available. The brochure outlines and illustrates the precision investment casting process, with emphasis on size, design, shape, tolerance, finish, quantities, and cost, including die cost. *Precision Castparts Corp.*

For more data circle No. 52 on card

continued on page 113

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AMERICAN FOUNDRYMAN

616 S. Michigan Avenue

Chicago 5, Illinois

Reader Service Dept.

53|12

Please send me detailed information on the Foundry Information circled.

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★ Please print or type information below

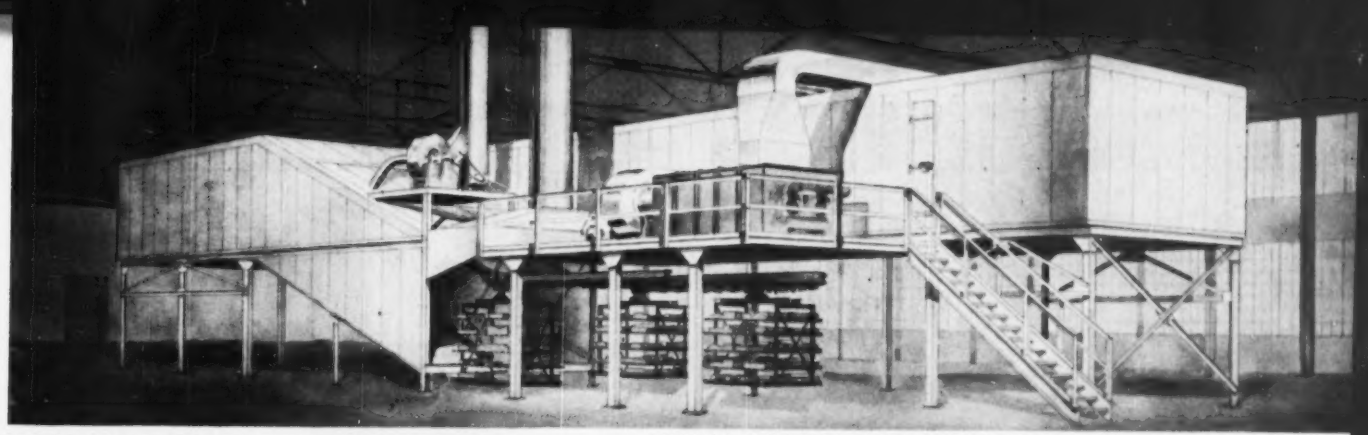
NAME

TITLE

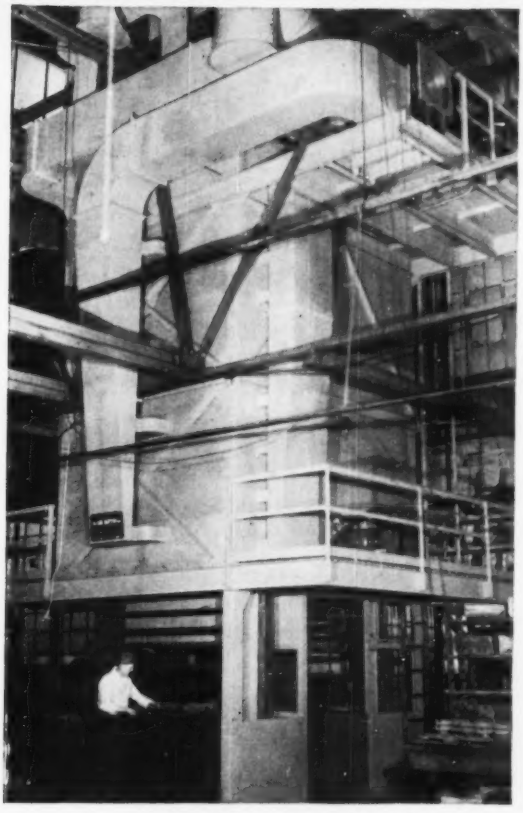
COMPANY

ADDRESS

CITY AND ZONE



CARL-MAYER HORIZONTAL MONORAIL CORE OVEN at Eclipse Aviation Co.
Patent No. 2355814

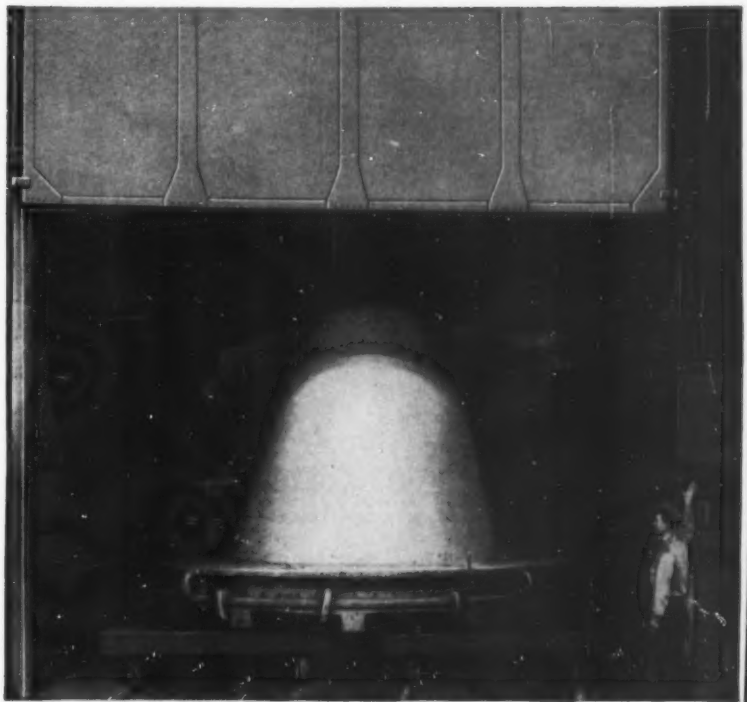


CARL-MAYER VERTICAL CORE OVEN
at G. & C. Foundry Company
Patent Nos. 2257180 and 2628087

"BIG" Engineering brings big foundry oven jobs to CARL-MAYER

Carl-Mayer designs embody patented features which contribute to highest efficiency and economy in operation. It will pay you to consult us on your next core baking and mold drying problem. We build ovens of all types and sizes, also other types of industrial ovens and furnaces.

Write For Bulletin No. 53-CM.



CARL-MAYER MOLD OVEN. One of a battery of two at Pittsburgh Steel Foundry Corp. Capacity: 100 tons per charge (each oven). PATENT APPLIED FOR.

CARL-MAYER CORE AND MOLD OVENS ARE SERVING CONCERNS LIKE THESE:

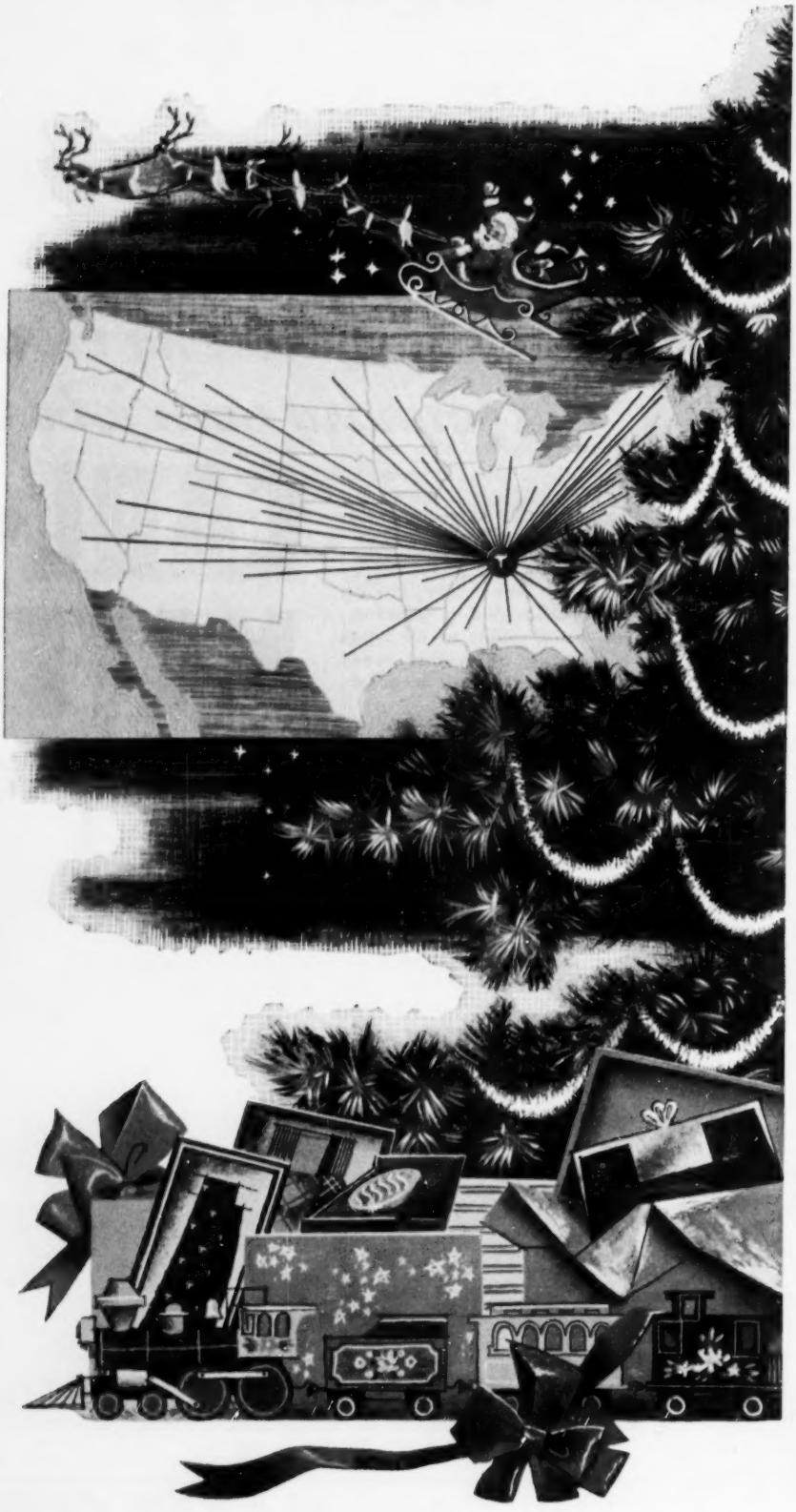
Aluminum Co. of America
American Brake Shoe Co.
American Radiator Co.
Blaw-Knox Co.
Brown Industries
Buick Motor Div. of General Motors Corp.
Bucyrus-Erie Co.
Cadillac Motor Div. of General Motors Corp.
Columbia Steel Corp. (U. S. Steel Corp.)
Crucible Steel Castings Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
G. & C. Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Mesta Machine Co.
F. E. Meyers & Bro. Co.
Oil Well Supply Co. (U. S. Steel Corp.)
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
H. B. Salter Co.
Shenango Penn Mold Co.
Standard Foundry Co.
Union Brass & Metal Mfg. Co.
Union Steel Castings Co.
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

THE CARL-MAYER CORP.

3030 Euclid Ave., Cleveland, Ohio

Backed by reputation and over 30 years' experience

THERE'S A TOUCH OF TENNESSEE IN MERRY CHRISTMAS

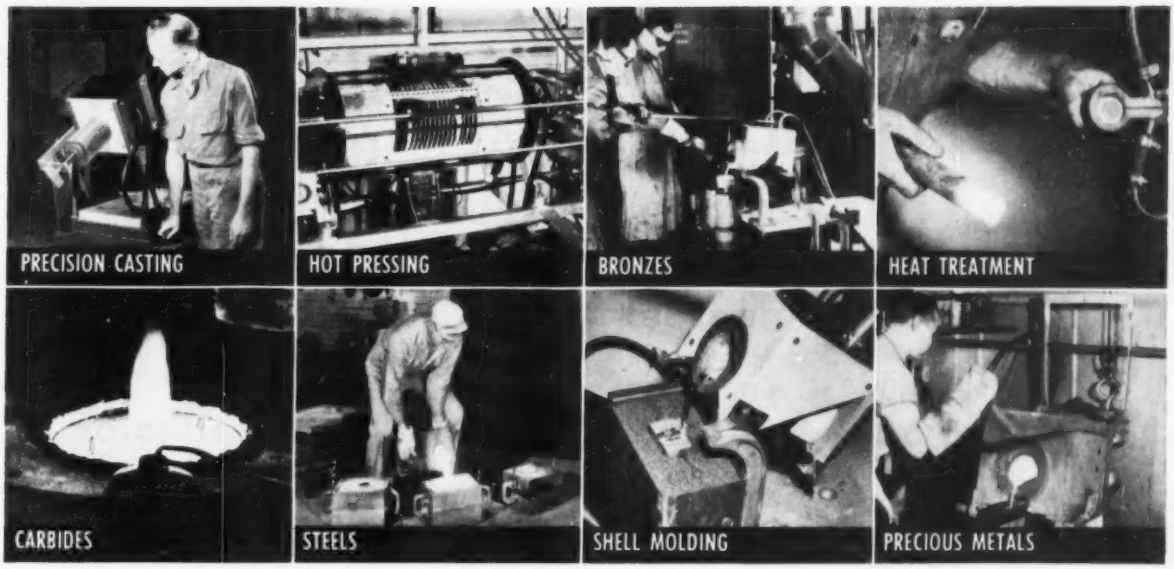


In Dad's necktie,
in Mother's handbag,
in Junior's socks,
in Sister's compact,
in Baby's toys.

To those industries across the nation whose business has made Tennessee Products what it is, and to the millions of Americans they serve—
a Merry Christmas
and a Happy New Year.

TENNESSEE
PRODUCTS & CHEMICAL
Corporation
NASHVILLE, TENNESSEE

Producers of: **FUELS • METALLURGICAL PRODUCTS • TENSULATE BUILDING PRODUCTS • AROMATIC CHEMICALS WOOD CHEMICALS • AGRICULTURAL CHEMICALS**



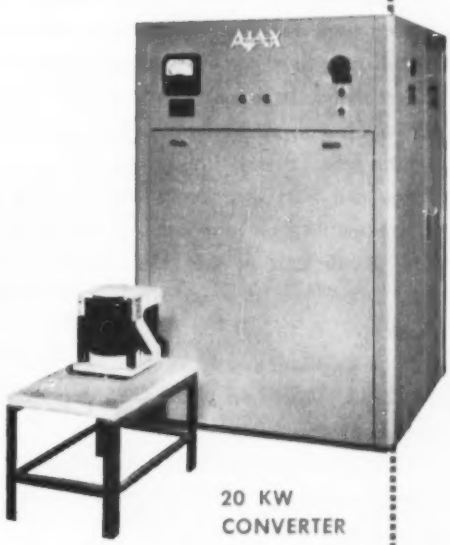
"In Production" — with Minimum Investment

AJAX-NORTHRUP Converter-Operated FURNACES

The 20 kw. converter will melt 17 pounds of steel in 40 minutes. Maximum capacity is 30 pounds of steel or 60 pounds of bronze. The larger 40 kw. unit melts faster, will handle up to 50 pounds of steel. The 6 kw. unit melts a pound of steel in 8 minutes. Controlled temperatures to 4500 deg. F and higher make these furnaces ideal for sintering and hot pressing carbides.

Ajax-Northrup converters are compact and self resonating. They require no special foundation or wiring—and they're certified to meet F. C. C. regulations.

Thousands of these units are in daily use. Many of today's prominent industries actually got their start with an Ajax-Northrup 20 kw. converter. Write for bulletins.



20 KW CONVERTER

Since 1916

AJAX NORTHRUP

INDUCTION HEATING AND MELTING

AJAX ELECTROTHERMIC CORPORATION
Ajax Park, Trenton 5, New Jersey

Associated Companies

AJAX ELECTROMETALLURGICAL CORP.
AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC.
AJAX ENGINEERING CORPORATION

153

SAFEGUARD YOUR PERSONNEL and your PROPERTY!

Eliminate dangerous gases, fumes and dust with a MULTI-WASH collector

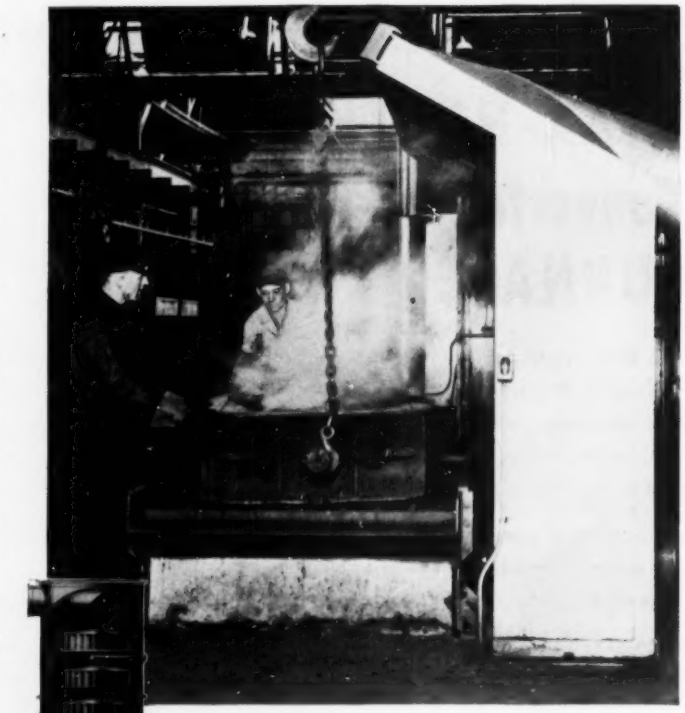
It will pay you to consider the many advantages of a Multi-Wash dust collecting system.

With Multi-Wash you won't have to dig yourself out of accumulated dust particles and furthermore you'll eliminate the danger of a spontaneous fire. Personnel too, will find conditions more agreeable and production will increase, because the cause of sick leave due to ailments attributable to dust and fumes will be substantially eliminated.

You can start in a small way to clean up objectionable dust and fumes by installing a Multi-Wash unit in the most offensive area first. Later, you can add on as conditions warrant.

From a dollars and cents approach you'll be far ahead with Multi-Wash both production-wise and maintenance-wise.

Be wise, contact your local Schneible representative or write direct for a further study of your dust and fume problem.



MULTI-WASH

MULTIPLIES WASHING FOR TOP EFFICIENCY

CLAUDE B. SCHNEIBLE CO.

P. O. Box 81, North End Station
Detroit 2, Michigan

PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

SCHNEIBLE

SALLOY

"SALLOY" was developed by our Metallurgical department to meet the needs of:
The pressure match plate industry and sand foundries for production of superior aluminum matchplates

A SUPERIOR ALUMINUM ALLOY FOR BETTER MATCH PLATES

This matchplate shows the bright, flawless surface and sharp detail which result from using "SALLOY"

IF you are interested in better match plates, "Salloy" offers you these 6 advantages . . .

- Engineered-quality results in sound plates
- Produces fine-textured surfaces which are both bright and flawless
- Excellent castability . . . gives extremely sharp impressions and reproduces fine details with perfect fidelity
- High fluidity — requires no fluxes or additions
- May be heat-treated to obtain extremely high strength (45,000 to 50,000 P. S. I.)
- Can be chromium plated for increased life

For further details, write to our Metallurgical department today

Factual photographs—courtesy of Pressure Match Plate Co., Phila., Pa.

"Salloy" is a product of creative metallurgy developed and manufactured exclusively by

America's Most Modern Aluminum Plant

the George Sall Metals Co. *inc.*

2300 East Butler Street, Philadelphia 37, Pa.

Foundrymen in the News

Leroy J. Wieschaus has been appointed district manager of the Birmingham sales office of American Wheelabrator & Equipment Corp.,

L. J. Wieschaus . . . District Manager

Mishawaka, Ind. His new offices are located in the Farley Building, Birmingham, Alabama. Mr. Wieschaus has been in the home office of the company for more than seven years.

Doctor Kurt Peter Anderko has been named to the staff of Armour Research Foundation of Illinois Institute of Technology, Chicago, as a full research metallurgist. Dr. Anderko comes to the Foundation from the Max Planck Institut fur Metallforschung of the Technische Hochschule, Stuttgart, Germany, where he was studying and conducting research.

Joseph E. Lindsay, formerly research engineer, has been advanced to assistant manager of the engineering service department of the National Radiator Co., Johnstown, Pa.

William J. White has been elected vice-president and general manager of the Shallway Corp., Connellsville, Pa.

Joseph M. Halloran has been appointed sales representative covering the New England territory for Ajax Engineering Corp., Trenton, N. J. He will handle the company's line of low frequency induction furnaces.

W. Monroe Wells has been named assistant vice-president in charge of operations, Reynolds Metals Co. For the past three years, Mr. Wells has served as general production control manager for the company, with headquarters at its executive office in Richmond, Va.

Jiro Inakawa, president, Futaba Casting Co., Ltd., **Shigekichi Aikawa,** president, Aikawa Casting & Machine Co., Ltd., and **Motomi Ono,** president, Ono Electric Casting Co., Ltd., visited Chicago-area foundries recently studying production methods for gray iron castings. Mr. Inakawa is vice-president and Messrs. Aikawa and Ono are directors of the Japan Iron Castings Association.

The board of directors of R. B. Carolin Foundry & Machine Co., Detroit, have elected **William J. Meakin** to executive vice-president. He was formerly distribution and sales manager of the company. Mr. Meakin was recently named to the board of directors of the Non-Ferrous Founders' Society.

A. G. Trivison has been appointed manager of Industrial Oven Div., W. W. Sly Manufacturing Co., Cleveland. He was formerly assistant manager of

A. G. Trivison . . . Appointed Manager

sales for Industrial Ovens, Inc., and in his new capacity he will be responsible for all phases of engineering and sales of Sly "Convectioneered" ovens.

Fred E. Fishman has joined the firm of Sipi Metals Corp., Chicago. He will be in charge of the company's Indianapolis office at 215 Circle Tower.

Harold G. Liebold has been elected director of Silica Chemicals, Inc., a newly formed subsidiary of the Cleveland Quarries Co. **George S. Love** has been elected secretary-treasurer of the new company.

Awards of $2,000 each have been made to **Otto Zmeskal,** chairman, department of metallurgical engineering, Illinois Institute of Technology; **Albert W. Schlechted,** professor of metallurgical engineering, Missouri School of Mines and Metallurgy, and **William M. Armstrong,** associate professor of metallurgy, University of British Columbia, at the A.S.M. annual meeting in Cleveland. The purpose of the awards for teachers of metallurgy is to recognize outstanding leadership in the classroom and laboratory and in a measure reward this profession by wider acceptance and prestige.

A. C. Richardson, who has had supervisory charge of research in mineral processing at Battelle Memorial Institute, Columbus, Ohio, for the past 23 years, has been named technical director. He, with the Institute's other technical directors, will be responsible for the technical guidance of Battelle's research program for industry and the government.

Alex H. Homberger, consulting engineer, has become associated with the U. S. Engineering & Manufacturing Co., Chicago, as executive vice-president in charge of foundry development and consulting activities. He was formerly manager of the Precision Casting Div. of the Michigan Steel Casting Co.

Doctor Marvin E. Mundel has been appointed associate director, of the newly created Management Center of Marquette University. Previous to joining the staff, Dr. Mundel, was di-

Dr. M. E. Mundel . . . With Marquette

rector of the Ordnance Management Engineering Training Program of the U.S. Army Ordnance Corps. He is a member of the Time, Study and Methods Committee of AFS.

continued on page 26

Foster Machine Company reports:

Up to 50% lower costs through shell molding

various textile machine parts

using

MONSANTO'S RESINOX 736 RESIN

Truer, cleaner castings produced from shell molds bonded with Resinox 736 resin resulted in over-all savings of 15% on this textile machine part, cast by Shell Process, Inc., Chicopee, Mass. for the Foster Machine Co., Westfield, Mass. Savings up to 50% are being realized on other parts now being shell molded for Foster.

How does shell molding cut costs? From their experience, Foster reports . . . "partly from less hand and machine finishing than required with conventional casting methods; partly from faster rig-up time."

For the user, shell molding in practice delivers castings with surface finish *superior* to that of any similar casting made in a sand mold. This means large savings on clean-up . . . in some cases a 100% reduction! Castings, too, are produced to closer tolerances, with good detail on intricate shapes and thin sections.

In the foundry, shell molding usually increases productivity over other casting methods . . . permits a more compact, efficient operation . . . greater production per man hour with unskilled help. Other gains: increased metal yield, less sand handling, cleaning and grinding.

Monsanto will be glad to tell you more about the cost-saving advantages of shell molding . . . and the particular advantages of Monsanto resins for the foundry. For example, where stiffer shells are a "must," Resinox 736-A resin might be your answer. In addition to resins for shell molding, Monsanto produces phenolic and urea resins for core binding, and Lytron sand conditioner for conventional sand casting. For full information, mail the handy coupon today.

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Foundrymen in the News

continued from page 22

Colonel Willard F. Rockwell, who has resigned as assistant to Secretary of Defense Charles E. Wilson, has returned to his position as chairman of the board of directors of Rockwell

Col. W. F. Rockwell . . . Returns

Manufacturing Co. Before joining the Defense Department, Col. Rockwell took part earlier this year in the Mutual Security Agency evaluation study of American aid abroad, as assistant to MSA Director Harold Stassen.

A. M. Caito has been appointed works manager of Basic Refractories, Inc., Maple Grove and Bettsville, Ohio. He was production manager prior to his present promotion.

L. Boyd Hatch, executive vice-president of Atlas Corp., has been elected a director of Mercast Corp., which licenses a process for the manufacture of complex precision castings involving the use of frozen mercury patterns.

The services of **Percy C. Shaffer,** chief engineer, Cooper Alloy Foundry Co., Hillside, N. J., are being loaned to the Federal Government for a period of six months in order to assist the National Production Authority in the job of allocating nickel. Mr. Shaffer will serve without compensation on the board of the Nickel Section of the Iron and Steel Div. and will be quartered in Washington, D. C.

Doctor James F. Eversole has been appointed vice-president in charge of research of Bakelite Co., a division of Union Carbide and Carbon Corp. He was formerly manager of research administration of Union Carbide in New York City. He joined Union Carbide in the research organization of Carbide and Carbon Chemical Co. as a research chemist in 1929.

J. W. Bonnet, formerly New York office sales manager and head of the aluminum and foundry departments of Whitehead Metal Products Co., New York City, has been appointed administrative assistant to the vice-president. **J. J. Fitzgibbons** has been appointed manager of the foundry department and **F. R. Van Valkenburg** has been appointed manager of the aluminum department.

Donald W. Withrow has been appointed methods engineer for Electro Refractories & Abrasive Corp., Buffalo, N. Y. He was formerly development and design engineer for Buffalo Pottery Co., Buffalo, N. Y.; A. J. Wahl Co., Brockton, N. Y., and M. W. Kellogg Co., New York City.

Eldo Finley has been appointed general superintendent of the San Francisco Iron Foundry Co., San Francisco, in charge of all operations. He replaces R. C. Noah, who resigned. The firm is known as the producer of safety treads under the patented trade name of "Finlenite," a compliment to Mr. Finley, who was largely responsible for the product's design.

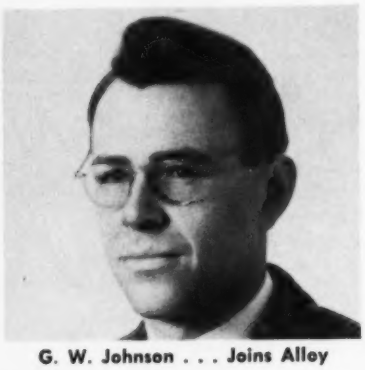
After more than 50 years of service as a foundryman, **Frank Moritz,** floor molder for the Hansell-Elcock Co., Chicago, is retiring. He was recently presented a 50 year service button by H. S. Faust, president of the company. He started his career with the firm in 1896.

Roy W. Schroeder has been appointed associate professor of the pattern and foundry laboratory, Uni-

Roy C. Schroeder . . . Promoted

versity of Illinois, undergraduate branch, Chicago. He was formerly assistant professor.

Gordon W. Johnson has been appointed associate project director on casting design-process manual by Alloy Engineering and Casting Co. He was



G. W. Johnson . . . Joins Alloy

formerly supervisor of foundry research at Armour Research Foundation, Chicago.

K. J. Kettner has been appointed as district manager in the Northeastern Ohio district for the Ramtite Co., a division of the S. Obermayer Co., Chicago. He will be in charge of all sales, service and installation of Ramtite products in the district.

Arthur S. Klopf has become a principal in, and vice-president of Sessions Engineering Co., Chicago. Long active in AFS work, he is a former president of the Chicago Chapter and member of national committees.

American Brake Shoe Co. has appointed **Charles M. Ruprecht** president of its Electro-Alloys Div. He was formerly vice-president of the division, which is located in Elyria, Ohio. Mr. Ruprecht was with Jones & Laughlin Steel Corp. before joining Brake Shoe. In 1946 he joined American Manganese Steel Div. of Brake Shoe and in 1947 was promoted to sales engineer.

The University of Wisconsin has promoted **R. W. Heine** to the grade of associate professor from his previously held assistant professorship.

David C. Ekay has been promoted to the rank of assistant professor at Pennsylvania State College. He was formerly a foundry instructor at the college. He is actively engaged in research as well as teaching and continuing work toward his doctor's degree.

Joseph D. Brubaker has been appointed treasurer and a member of the Board of Directors of the Standard Horse Nail Corp., New Brighton, Pa. The appointment was made to replace the vacancy caused by the death of A. L. Bingham. Mr. Brubaker is cashier of the Union National Bank and also a director of the Beaver County Federal Savings and Loan Association.

1913

1953

40 years of service

This year City Pattern Foundry and Machine Company is celebrating its fortieth year in business; forty years that have marked many gratifying changes in our plant size and facilities. In 1913, we produced our first pattern in a small second story shop with a total complement of two employees. Today in one of the largest and best equipped plants in the industry our employees number close to three hundred.

However, one thing has *not* changed in forty years . . . that is our unvarying goal to produce the finest in pattern and machine work in the most efficient and economical manner possible.

To the many loyal companies who have made possible the City Pattern Foundry & Machine Company of 1953, we pledge continued efforts to constantly keep our skills and facilities abreast of their needs.

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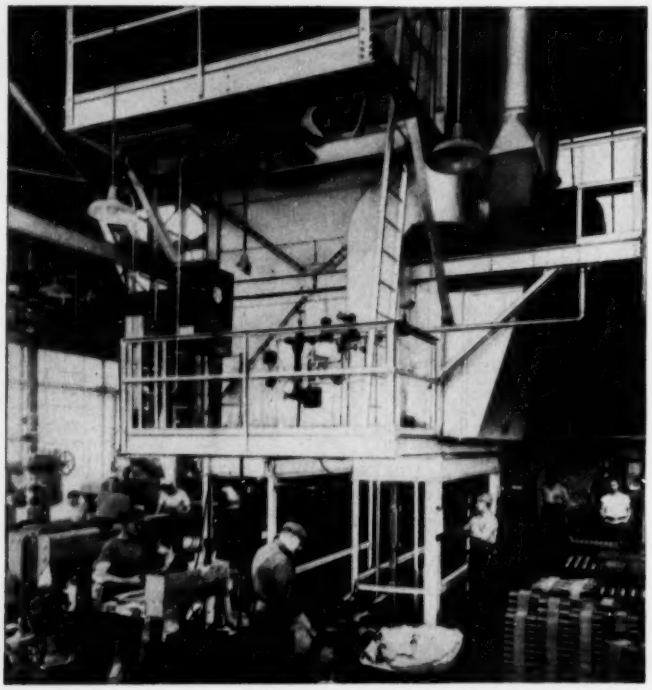
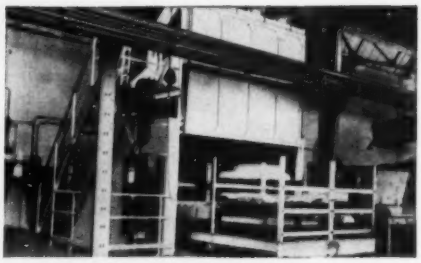


Coleman Tower Oven at Wells Manufacturing Co.



Coleman Car-Type Core Ovens at Pettibone-Mulliken Co.

Coleman Car-Type Mold Oven at The Bullard Co.

Battery of Coleman Transrack Core Ovens at The Crucible Steel Castings Co.

You should get all the facts concerning the core and mold ovens you expect to install... because the right ovens will increase your production and your profits. Over 80% of Coleman Ovens are "repeat orders" from past customers... proving performance to *complete satisfaction*. Coleman Ovens are the choice of leading firms in every branch of the foundry industry from small shops to large production foundries. You get over 50 years of know-how and experience in every Coleman Oven, so why gamble with inferior designs? Coleman Ovens of proved performance cost no more... and pay for themselves quickly out of savings in fuel, labor and increased production. Get the facts today...

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THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD CLEVELAND 13, OHIO

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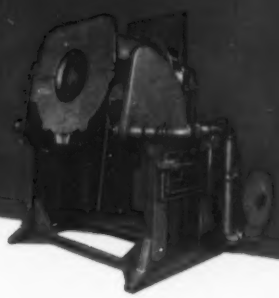

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Yes, you actually save money when you use Sterling Steel Flasks in your foundry. The famous ROLLED STEEL CHANNEL construction gives Sterling Flasks the strength and rigidity to withstand abuse, year after year. You can treat 'em rough and they still retain their accuracy. The unusually long service records of Sterling Flasks, in America's leading foundries, bring the annual flask cost down to rock bottom. That's why we say, *when you buy the BEST . . . you're bound to get a BARGAIN.*

Style 3⅛ ND-RT flasks used in iron foundry.

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TASIL Burner Block installed in a No. 225-4 Dual Fuel Burner of the North American Manufacturing Co., Cleveland, Ohio, leading producers of industrial fuel-burning equipment. TASIL Burner Blocks are standard equipment on North American burners for high temperature applications.

The better burner block is TAYLOR SILLIMANITE!

PRE-FIRED BURNER BLOCKS of Taylor Sillimanite (TASIL) are preferred by North American and a majority of leading furnace and burner manufacturers for high temperature applications. TASIL is specified because the block must hold original contour and dimensions. Compared to blocks made of fireclay or most other refractory materials, TASIL has superior resistance to shrinkage, cracking or spalling. TASIL further qualifies because it is inert in either oxidizing or reducing atmospheres; has higher fusion point and resistance to corrosion by most industrial slags. For longer service from your heating, annealing or forging furnaces, specify TASIL burner blocks.

In an emergency, when a burner block failure occurs at the time your stocks of pre-fired shapes are depleted, you can ram your own TASIL Burner Blocks, on the job, with one of several TASIL Ramming Mixes *engineered* for this application. Burner Blocks which may be cast or poured in molds, air dried and placed in service can also be made from TASIL Hydrocast—the hydraulic-setting castable for use to 3000° F. Data on TASIL Ramming Mixes are given in Bulletin No. 315 . . . on TASIL Hydrocast, Bulletin No. 313. Write direct, or contact your Taylor field representative, for your free copies.

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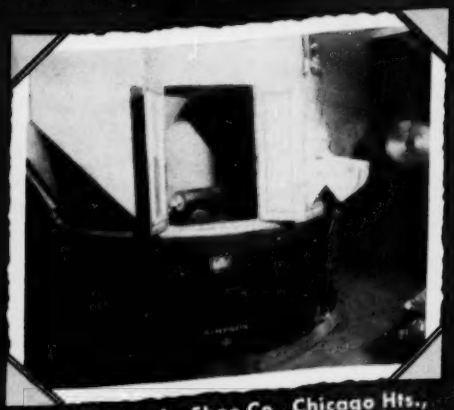
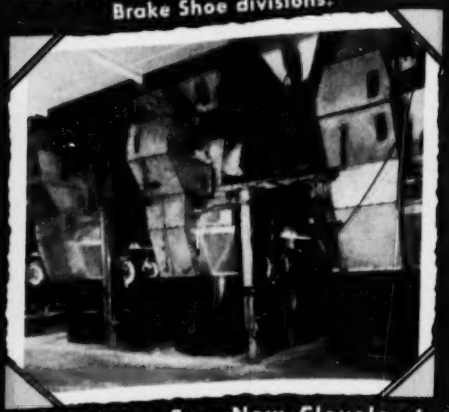
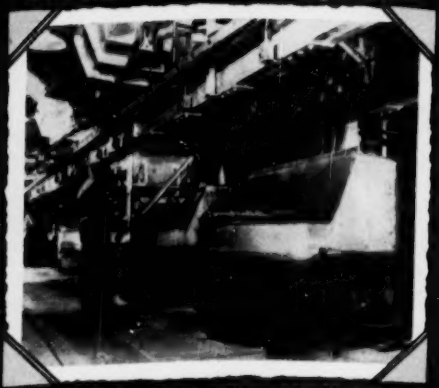


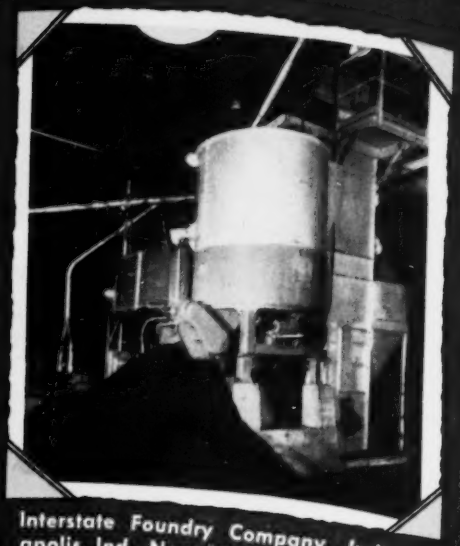
American Brake Shoe Co., Chicago Hts., Ill. One of 3 new Simpsons at American Brake Shoe divisions.



Ford Motor Co.—New Cleveland Foundry uses six #2F Simpsons to produce core sand for Ford 6 Engine blocks.



Studebaker Motor Co.—12 Simpsons provide quality core and molding sand for South Bend, Ind. foundry.



Interstate Foundry Company, Indianapolis, Ind., New #2F "Utility Unit" has improved sand control.

Superior Foundry Co., Cleveland, Ohio. Average moisture variation of only 0.2 of 1% in mixing operations.

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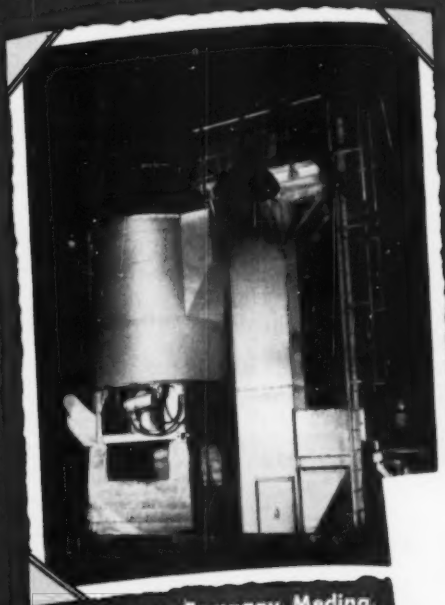
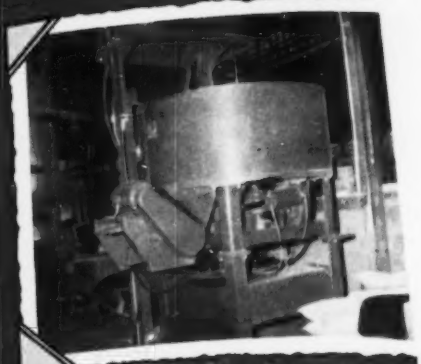


Henry Furnace Company, Medina, Ohio, 50% less bonding material with #2F Mix-Muller.

American Abrasive Metals Co., Irvington, N. J., Saved $2,500 in bond alone in first year.



General Machine Company, Emmaus, Pa. New #2F is their third Simpson Mix-Muller.

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SIMPSON MIX-MULLERS IN THOUSANDS OF FOUNDRIES ARE HELPING TO INCREASE PRODUCTION AND IMPROVE QUALITY.

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To provide the most flexible operation under all conditions, these 2F and 3F Simpson Mix-Mullers are equipped with spring-loaded mullers. Pressure is easily and quickly adjusted to provide the most efficient mulling action for the type of sand being conditioned. As sand strength builds up toward the end of the mixing cycle, muller pressure is automatically adjusted by the spring-loaded device.

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Let's Be Realistic in the Foundry

■ Cancer is difficult to face. Often it's easier to pretend it's not there . . . to look the other way . . . to ignore the dread disease until it's too late or, at least, until the cure is painful and expensive.

A number of foundrymen seem to have the same unrealistic attitude toward problems of safety, of hygiene, and of air pollution. They look the other way, apparently hoping that *their* shop will not fall below decent standards or that *they'll* not be noticed if they should happen to violate local ordinances. They're like the man with cancer who doesn't want to be reminded of it even though he knows he should give it prompt attention.

Industrial health, pollution of the atmosphere, and safe working conditions are receiving more and more attention from civic groups, governmental agencies, and others. Problems in those fields will not disappear while those who choose to ignore them turn their backs.

Effective, positive action by foundrymen calls for:

1. Recognition of the industry's record in foundry health, safety, and air pollution.
2. Aggressive action to improve the record which, though not bad is capable of considerable improvement.
3. Publicizing the good work the industry has already done and what it is doing to better its record.

There is ample evidence that foundrymen can improve their industry's record. Silicosis, once exaggerated far beyond its true proportion and into the realm of a racket has been brought under control by aggressive action of the foundry industry and foundry equipment manufacturers.

Attitude in the past of many in the industry toward air pollution seems to have been one of pretending it doesn't exist. Notable advances have been made in some localities, and some foundries are backing the industry-wide Safety & Hygiene & Air Pollution Program. No one better than the foundry industry knows how to deal with its own air pollution problems. In days gone by the industry and the equipment manufacturers who supply it were leaders in developing data and facilities to cope with ventilation and air pollution problems.

Now it is time for the castings industry to again assert itself in this field and demonstrate its ability to solve its own problems. This course is faster, cheaper, and more likely to be broadly acceptable by foundries than if non-foundry agencies attempt to do the job. The treatment in the latter case will be worse than the disease and may well result in no cure at all.

Like cancer, the situation may be difficult to face. Like cancer, our air pollution problems can be cured if tackled early. Every member of foundry management owes it to himself, his industry, and his community to face up to the air pollution, safety, and health problems of the industry. And to participate in the Safety & Hygiene & Air Pollution Program in every possible way—financially, personally, and by adopting the forward-looking recommendations of the S & H & AP Committees.

William N. Davis

WILLIAM N. DAVIS, *Director,*
Safety, Hygiene and Air Pollution
American Foundrymen's Society

Gating to Control Pouring Rate And Its Effect on the Casting

F. J. McDonald / *Factory Manager, Saginaw Malleable Iron Plant, General Motors Corp.*

Influence of pouring rate was studied as part of a quality control program. Over 1200 hours were devoted to determination and evaluation of the factors which control pouring rate by Steve Spess in fulfillment of thesis requirements for a degree. The following paper appears in *AFS Transactions* for 1953.

F. J. McDonald

■ Although pouring rate will be affected by molding sand conditions, iron temperature and analysis, casting design, gating, type of molding equipment, molding technique, etc., this study deals only with iron pressure and the area through which the iron flows. Thus we take into consideration sprue cups, sprue posts, ladle height, cross-sectional runner area and skim cores.

Many times throughout the article strains and swells are mentioned as being the result of excessive pouring rate. It is recognized that these defects can be caused by other conditions—mainly out-of-range sand, improper amount of jolting, or improper squeezing. Therefore, it is well to mention that the sand used for all test molds was held within the following limits:

Moisture	3.3 pct
Green Compressive Strength	10.0-10.5 psi
Permeability	80-85

The molds were made on automatic jolt-squeeze machines which control the number of jolts and the time and pressure of the squeeze.

The plant is highly mechanized, and the process of making and pouring molds is duplicated many times an hour on production conveyor lines. In order to simulate production technique, all test molds were made and poured in sets of five on a regular production conveyor line. The molding technique was duplicated for each set of molds, and each set was poured by the same iron pourer.

The molds were shaken out manually to keep the gating systems and the castings intact. Gates were allowed to cool, and were then cleaned, weighed and inspected for defects. Thus, for each test mold poured, the following data were recorded: date, time, job number, weight poured, pouring time, total weight of iron poured, and any casting defects. Pouring time as expressed in the report was the elapsed time from when

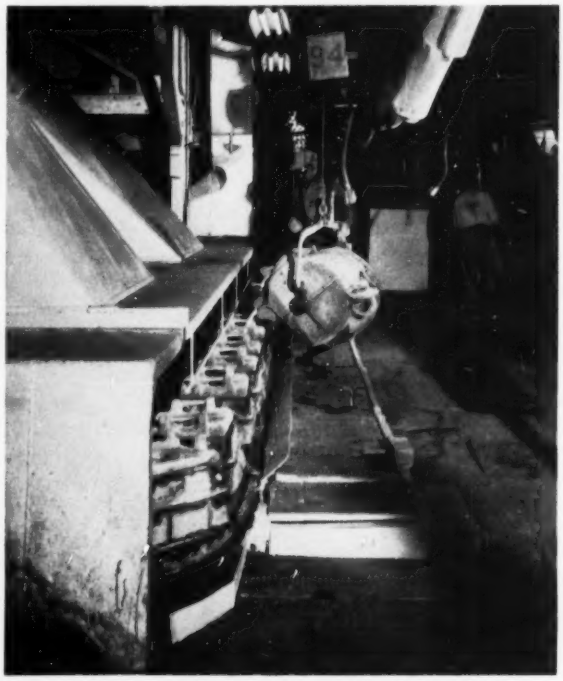


Fig. 1—Pouring operation from teapot-type ladle suspended from electric hoist on overhead monorail.

the iron started from the ladle spout until it stopped.

The iron flow in these molds was direct from the ladle spout downward into the sprue cup, through the sprue hole and horizontally through the runner into the shrink bobs and into the casting.

In the investigation of the effect of sprue cups on pouring rate and casting defects, three different type cups were used (Fig. 2). All other factors such as sprue hole size, cross-sectional runner area, etc., were kept constant.

The standard cup is used on the majority of production jobs. The ribbed sprue cup is used where it is necessary to place a skim core in the cope mold. The special cup is used rarely but was tested for data purposes.

Comparison of Test Castings

Two tests were run with each sprue cup—one test with no skim core in the gating system, and one test with a skim core placed in the drag at the base of the sprue hole. The data from the first test are shown at the top of Table 1. The castings of the test were compared, and the only noticeable difference was that those poured with the standard cup showed a few parting fins or a tendency toward strain.

TABLE 1—SPRUE CUP TEST AVERAGES

	Pouring Time, min	Poured Weight, lb	Pouring Rate, lb/min
Test No. 1—Without Skim Core			
Standard Sprue Cup	0.096	17.55	182.8
Ribbed Sprue Cup	0.109	18.25	167.4
Special Sprue Cup (modified)	0.116	16.35	140.9
Test No. 2—Skim Core in Drag			
Standard Sprue Cup	.115	15.4	134.0
Ribbed Sprue Cup	.117	15.35	131.2
Special Sprue Cup (modified)	.132	14.75	111.8
Special Sprue Cup (modified)	.134	14.90	111.3

The data of the next test with the skim core in the drag are shown at the bottom of Table 1. The double test series with the special sprue cup was used to see if the data could be duplicated or reproduced. Comparing castings from this test, it was noted that those poured with the special sprue cup showed a smooth and shiny surface. This is an indication that it was close to a misrun condition and that the pouring rate was at its lowest point possible for these castings.

With the sprue cups the only variable in these tests, it was concluded that the design of the sprue cup has a definite effect on the pouring rate.

Free falling iron from the ladle spout will gain velocity, but the velocity of the iron hitting a shoulder in the sprue hole will be reduced drastically at that point. Reducing the width of the shoulder or decreasing the angle from the vertical of the side walls of the sprue cup hole will increase the pouring rate if other factors are constant.

The test run with the skim core in the drag showed that the effects of the shoulder and side-wall angle were still present. More information about the skim in the drag appears later in this article.

The next tests were to determine how the sprue post diameter or sprue hole cross-sectional area affects the pouring rate. A round sprue post with one to three degrees draft was mounted on all cope patterns. The smallest diameter of the sprue hole in the mold was the diameter of the sprue post at the tip of the sprue cup impression in the mold.

Five sprue posts—each with two degrees draft—4 in. total length, and with base diameters of 3/8, 1/2, 5/8, 3/4 and 7/8 in. were used for this test. Figure 3 shows the 3/4-in. base diameter sprue post and also the cavity in the mold made by the sprue post and sprue cap. Seventy molds were made and poured in these tests.

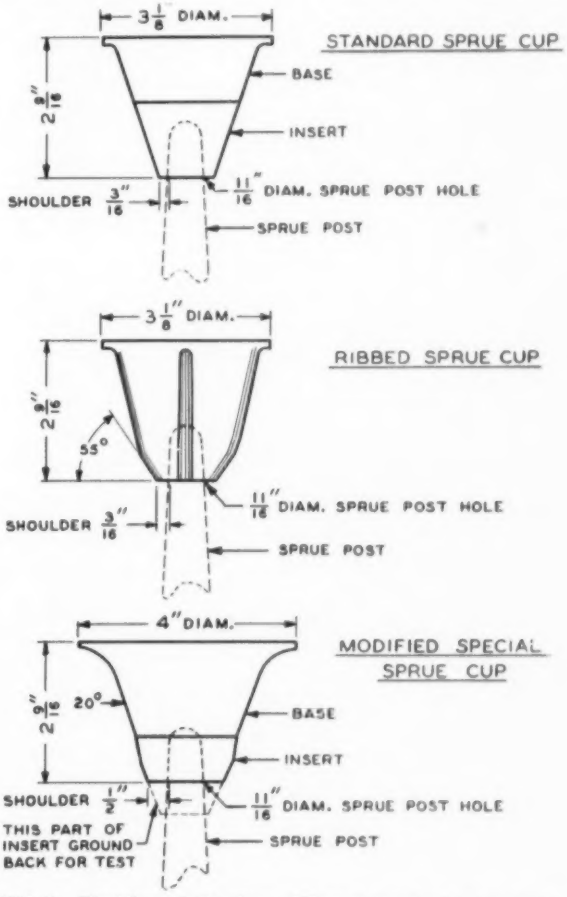


Fig. 2—Sketches of the three different types of sprue cups used in the investigation.

Table 2 shows the results of the three tests run. It is noticed that the sprue post diameter at the tip of the sprue cup is about 1/16-in. smaller than the base diameter because of draft. Twenty-five molds were made without skim cores in the gating system and with total cross-sectional runner area of 0.472 sq. in. Sixty-five per cent of the castings with the 5/16-in. minimum diameter holes were misrun. Seven per cent of the castings from the 7/16-in. diameter holes were misrun, and the rest had a smooth and shiny surface.

TABLE 2—SPRUE POST DIAMETER TEST AVERAGES

Sprue Post Dia. at Sprue Cup, in.	Sprue Post Area at Sprue Cup, sq in.	Pouring Time, min	Poured Weight, lb	Pouring Rate, lb/min
Test No. 1—Without Skim Core—0.472 sq. in. cross-sectional runner area				
5/16	0.0767	0.208	18.40	87.7
7/16	0.1503	0.200	20.10	100.5
9/16	0.2485	0.130	19.83	152.5
11/16	0.3712	0.125	20.44	163.5
13/16	0.5185	0.114	20.48	179.6
Test No. 2—Skim Core in Drag—0.472 sq. in. sectional runner area				
7/16	0.1503	0.183	17.85	97.5
9/16	0.2485	0.140	18.08	129.1
11/16	0.3712	0.138	18.05	130.8
13/16	0.5185	0.130	18.48	142.1
Test No. 3—Without Skim Core—0.750 sq. in. cross-sectional runner area				
11/32	0.0928	0.260	16.47	63.3
15/32	0.1726	0.128	17.58	137.3
19/32	0.2769	0.110	17.50	159.1
23/32	0.4057	0.094	17.25	183.5
27/32	0.5591	0.076	18.08	237.9

TABLE 3—SPRUE POST LENGTH TEST AVERAGES

Cope Size, in.	Length of Sprue Post, in.	Pouring Time, min	Poured Weight, lb	Pouring Rate, lb/min
4	1⅝	0.120	14.38	119.8
6	3⅝	0.121	14.50	119.8
8	5⅝	0.120	14.50	120.8

TABLE 4—RUNNER AREA TEST AVERAGES

Runner Area, sq in.	Pouring Time, min	Poured Weight, lb	Pouring Rate, lb/min	Casting Defects by Pieces
		Test No. 1		
0.098	0.225	13.00	57.8	2 pcs. slag
0.162	0.165	13.38	81.1	2 pcs. slag
0.250	0.135	13.50	100.0	2 pcs. slag
0.310	0.130	13.68	105.2	2 pcs. slag
0.430	0.130	13.88	106.8	2 pcs. slag
0.562	0.130	14.12	108.6	1 pc. slag, 1 pc. OK
		Test No. 2		
0.250	0.160	16.13	100.9	2 pcs. slag
1.031	0.160	16.13	100.9	none

No visual defects were noted from the 9/16 and 11/16-in. diameter holes, but a tendency toward strain and fins was noted on the castings from the 13/16-in. diameter sprue hole.

Twenty molds were then made with a skim core in the drag of the gating system. Eight per cent of the castings from the 7/16-in. diameter hole were misrun, and the others had a shiny surface. On the castings from the 9/16, 11/16 and 13/16-in. diameter holes there were no visual defects.

Twenty-five molds were then made with the gating system having a cross-sectional runner area of 0.750 sq. in. and no skim cores. Fifty-seven per cent of the castings with the 5/16-in. diameter hole were misrun. Two per cent of the castings with the 7/16-in. diameter

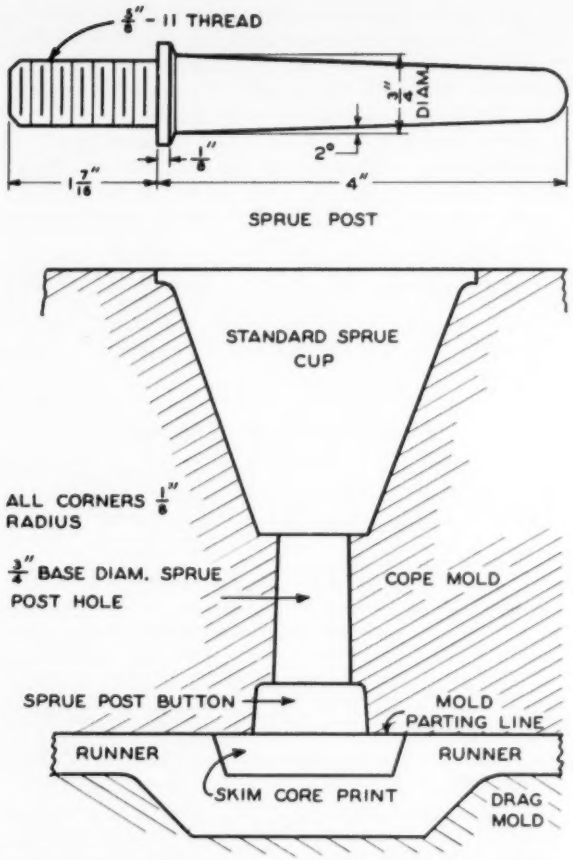


Fig. 3—Sketch showing ¾-in. diameter sprue post, also cavity in mold made by sprue post and sprue cup.

holes were misrun, and others showed a misrun tendency. The 9/16, 11/16 and 13/16-in. diameter holes produced castings with no defects, but as the sprue post hole increased, the castings became rougher and showed a tendency toward strain.

Increase of Pouring Rate

Plotting the sprue post cross-sectional area against the pouring rate, we find the pouring rate will increase until the sprue-post area approaches the smallest area in the gating system. A sprue-post area larger than the runner area would be of no value in increasing the pouring rate. Conversely, where skim cores are used only as a choke source, the same effect can be obtained by eliminating the skim core and using a smaller sprue post.

The next test was to determine what effect sprue-post length had on the pouring rate. The test molds were made off the same pattern on the experimental floor. All drag molds were the same while the cope molds were made 4, 6 and 8 in. high. The sprue holes were cut with the same hand sprue cutter, thus giving all molds the same sprue hole cross-sectional area at the smallest point.

To eliminate the pouring height variable, the pouring spout was kept at a constant height of 14 in. from the parting of the test molds, and the iron was poured

directly into the sprue cup. Table 3 shows the data accumulated from these tests. There were no casting defects nor difference in the appearance of the castings. There was a considerable amount of slag in the runners, but none in the castings. Varying only the cope height does not vary the pouring rate. The pressure head is determined by the height of the ladle from the parting line and not by the height of the cope mold. The effect of side-wall resistance of the longer sprue holes is nil. In this test, the effective sprue cross-sectional area was 0.248 sq. in. while the runner cross-sectional area was 1.03 sq. in. This condition gave us a low iron velocity through the runner and allowed the slag to come to the top and be trapped in the runner.

Least Restriction

It is fundamental to say the runner cross-sectional area should be large enough to get the molten iron into the mold cavity with the least amount of restriction. However, in some cases it is necessary to choke the runner to eliminate strains, swells, run-out or core wash. At this plant all runners have ten degrees draft on each side, and similar jobs have similar runner area. Two separate tests were made, varying only the runner cross-sectional area, and keeping the sprue hole, runner length and ladle height the same.

Twelve test molds were made in this phase of the experiment—each two molds with a different sized runner. The results are shown in Table 4. Of the 12 test castings, only one from the 0.562 sq. in. runner was a good casting and free of slag. On the second test, one mold with a smaller runner and one with a larger runner were poured consecutively out of the same ladle. The results are shown at the bottom of Table 4. The castings with the small runner area were scrap due to slag, and those from the large runner area showed slag in the first few inches of runner but none in the casting.

These tests show that increasing the runner cross-sectional area increases the pouring rate until the runner cross-sectional area equals the sprue post cross-sectional area. From there on, increasing the runner area does not appreciably affect the pouring rate. Making the runner area four times as big as the sprue-post area has no effect on the pouring rate.

From the continuity equation (quantity equals area times velocity), it is determined that if the pouring rate is constant and the runner area is increased, the iron velocity must decrease, and that is what happened in the second test. Using the equation and the data accumulated, it is determined that an iron velocity of 0.750 ft/sec in 5 in. of runner length will eliminate slag defects without benefit of skim and slag cores in the gating system. The runner must be full of iron to obtain trapping action.

The next test was made to determine the effect of runner chokes on the pouring rate and casting defects. Runners are choked to maintain constant flow of iron to all mold cavities and to minimize or eliminate casting defects such as strain, swells, run-out and core wash. A runner choke is simply some point on the runner that has been cut down to give less runner cross-sectional area at that point. Two tests

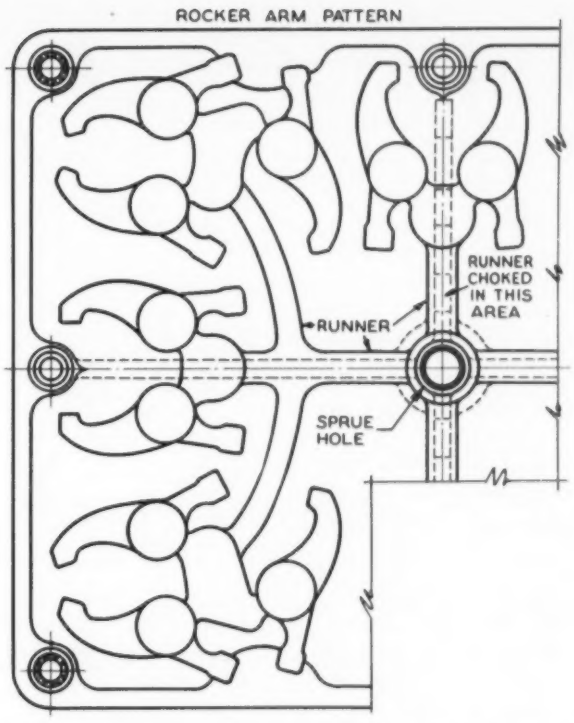


Fig. 4—Rocker arm pattern. Two tests of ten molds each were run on this pattern during the investigation.

TABLE 5—RUNNER CHOKE TEST AVERAGES

Minimum Total Runner Area at Choke Location, sq in.	Pouring Time, min	Poured Weight, lb	Pouring Rate, lb/min
Test No. 1			
0.472 skim core drag	0.132	18.20	138.0
0.750 skim core drag	0.116	18.20	157.0
0.472 no skim core	0.122	18.70	152.2
0.750 no skim core	0.106	18.98	179.0
Test No. 2			
Runners choked	0.658	106	161
Runners not choked	0.644	106	165

TABLE 6—LADLE HEIGHT TEST AVERAGES

Ladle Height, in.	Pouring Time, min	Poured Weight, lb	Pouring Rate, lb/min
Test No. 1—Runners Choked—No Skim Core			
0	0.205	20.43	99.3
6	0.136	18.63	137.0
12	0.120	20.05	167.1
18	0.140	20.18	144.1
Test No. 2—Runner Choked—Skim Core Drag			
6	0.152	18.05	118.8
9	0.138	18.85	136.6
12	0.140	19.08	136.3
Test No. 3—No Runners Choked—No Skim Core Drag			
0	0.170	19.29	113.5
6	0.095	19.28	202.9
9	0.092	19.83	215.5
12	0.094	20.18	214.7
Test No. 4—Molds of Different Part Using Skim Core in Drag Mold			
12	0.104	18.33	176.3
6	0.118	18.10	153.4
9	0.100	18.03	180.3

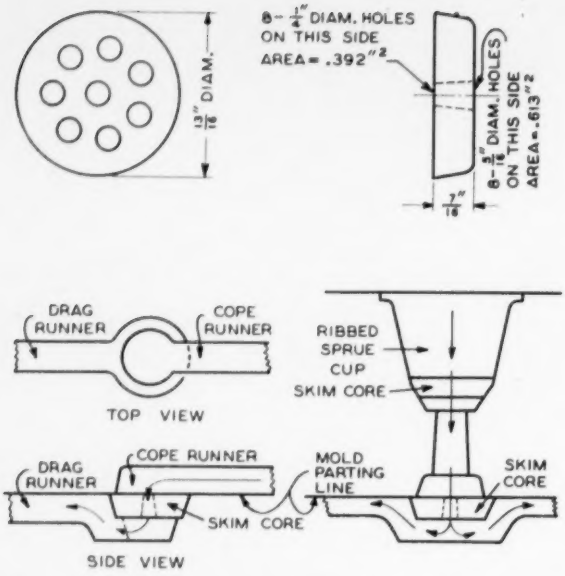


Fig. 5—View of skim core, showing location. Top: Views and dimensions of skim core. Bottom, left: Skim core in runner. Bottom, right: Skim core in cope (sprue cup) and in drag (at base of sprue post).

of ten molds each were run on the rocker arm pattern shown in Fig. 4.

In the first test the molds had a skim core in the drag, and in the second test the skim core was not used. In each test five molds were made with chokes in the runners and five with no chokes. The results are shown at the top of Table 5. There were no scrap castings from any of the test molds, but those made without the skim core and not choked had more parting fin and a tendency toward strain. They also had the highest pouring rate.

The total sprue post cross-sectional area is 0.371 sq. in., and the total runner cross-sectional area is 0.750 sq. in. The two runners feeding only two castings (Fig. 3) were choked down to 0.250 sq. in. The two runners feeding the eight castings were choked down to 0.222 sq. in. The total runner cross-sectional area was 0.472 sq. in., and even though this total area was larger than the sprue-post area, the pouring rate increased when the chokes were eliminated because 80 per cent of the iron passed through the runner cross-sectional area of 0.222 sq. in.

Fifteen test molds were also made from larger equipment with four differential case patterns mounted on it. The average results are shown at the bottom of Table 5. There were no casting defects. Sprue hole cross-sectional area was 0.371 sq. in. The total runner cross-sectional area leaving the base of the sprue post was 1.12 sq. in. This was choked down to a total runner cross-sectional area of 0.420 sq. in.

It is apparent from the results that removing the chokes had little effect on the pouring rate because the sprue hole area was already smaller than the runner area at the chokes. The results show that runner chokes control the pouring rate if they are the least area in the gating system. Casting defects such as strain, swell, run-out and core wash can be minimized by choking runners and reducing the pouring rate, and misrun can be reduced by eliminating chokes and increasing the pouring rate.

The factors affecting pouring rate that have been discussed thus far are parts of the permanent gating system. In the actual pouring of the mold a variable to be considered is the height of the pouring spout above the parting line. This is controlled by the iron pourer, and this section is a study of the effect of ladle height above the parting line on the pouring rate.

Use of Ladles

The ladles used at the plant are teapot type, holding between 600 and 700 lb of iron. The ladles hang from the single cable of an electric hoist which is on an overhead monorail (Fig. 1). Horizontal movement is obtained by the iron pourer holding the ladle in front of him as he rides on an escalator. Vertical movement is obtained by pressing the up or down button on the electric hoist. The ladle is tilted to pour iron out, and as the iron level decreases, the ladle is tilted more. This causes the distance between the spout and the parting line of the mold to decrease. The electric hoist makes it very easy to adjust for this and maintain a uniform pouring height by raising the ladle.

Three different test were run in this investigation using ladle heights—spout to cope mold—of zero, 6, 9, 12 and 18 in. The cope mold heights were kept constant. Zero height was obtained by pouring the iron into a pouring basin in the cope mold along side of and connected to the sprue cup hole. In this test 55 molds of a rocker arm composite were poured. Twenty molds had runners choked and no skim core; 15 had runners choked and a skim core in the drag. Twenty molds had no runners choked and no skim cores. The results of this series of tests are shown in Table 6.

In the test with the runners choked and without skim cores, 8 per cent of the castings poured from the zero height were misruns. No other castings showed defects, but those poured from the 12-in. height showed some strain and some parting fin. At 18-in. height the iron pourer had difficulty pouring the iron directly into the sprue cup.

The results of the test molds with runners choked and a skim core in the drag are shown next in Table 6. (There were no molds poured from zero inches in this test since 8 per cent of those with the skim core in the drag had misruns.) There were no casting defects detected in these 15 molds. Next in Table 6 are shown the results of test molds with no skim cores and no runner chokes. Six per cent of the castings poured from zero inches were misrun, and castings poured from 6, 9 and 12 in. were strained.

Fifteen test molds from another part using the skim core in the drag were poured. The results of these molds are shown at the bottom of Table 6. No visual defects were noted, although more fins or strain tendency were noticeable as pouring rate increased.

Velocity equals gravity multiplied by time; pressur-

equals height times density. When the iron enters the sprue-cup hole, it has gained velocity and pressure in falling from the ladle spout to the sprue hole. The iron also gains pressure and velocity dropping through the sprue-post-hole. When it reaches the parting line and changes direction, the pressure and velocity are used to force iron into the runners and into the mold cavities.

All of the results show that increasing the pouring height from zero to 12 in. increases the pouring rate. Increasing the pouring height over 12 in. reduced the pouring rate slightly. The effect of increasing the pouring height is dependent upon the permanent gating system, except where there is a skin core used in the cope. Increasing the pouring height on parts running with skim cores in the cope only slightly increases the pouring rate. Casting defects such as misruns and strains can be eliminated or minimized by increasing or decreasing the ladle height.

The next series of tests had to do with the effect of skim cores on the pouring rate. Figure 5 shows the skim core referred to and the three methods in which it can be used in the gating system. It is a baked sand core with eight ¼-in. diameter, tapered holes. It is used in the sprue-cup hole in the cope, at the base of the sprue-cup hole in the drag, or in the runner. It controls pouring and minimizes slag defects.

Since there were many tests and the data were quite lengthy, they are not published in this report. However, it was noticed that as the pouring rate increased, the severity of slag increased on parts prone to slag. Slag defects were found regardless of whether or not, skim cores were used.

Slag Defects Are Minimized

From the tests conducted on runner area, it was found that as the iron velocity in the runner decreases, slag defects are minimized. Therefore, skim cores do not remove slag directly, but by reducing the pouring rate and the iron velocity in a constant runner area, it allows more slag to adhere to the top of the runner. The skim core in the cope is the most effective in reducing the pouring rate, while the skim core in the runner is practically ineffective for this.

Skim cores in the gating system can be eliminated if other means such as smaller sprue posts or choking the runner are used to control pouring rate.

Since the tests described in this article were made using production equipment and under production conditions, the conclusions are applicable.

Many skim cores that tests showed were being used solely for the control of the pouring rate have been eliminated in this plant. This has resulted in considerable savings in materials and labor. Production was increased when the molder was relieved of setting the skim cores. Standard sprue-post diameters or runner chokes are used more extensively as controls of pouring rate.

Pouring guide bars as shown in Fig. 1 have been installed on all conveyor lines. This has resulted in a constant pouring height since the iron pourer adjusts the spout to the guide. Casting thickness variation caused by uncontrolled ladle height has been virtually eliminated.

Three New Publications Now Available at AFS

AMERICAN Foundrymen's Society now has three new publications available at National Headquarters in Chicago. The 800-page *Transactions* for 1953, volume 61, is now off the press. Copiously illustrated and case bound, the book contains all technical papers delivered at the 1953 AFS Convention in Chicago, together with many research and special committee reports.

Priced at $15 for non-members, $8 for members, the volume is an invaluable aid for foundry personnel, representing the latest and one of the most comprehensive compendiums of technical information available in the metals casting industry.

Transactions Index

AFS is also announcing the publication of its fourth periodical *Index to Transactions*, covering volumes 49 to 58 (1941-1950), inclusive. Three previous Indexes have been compiled by the Society, the first in 1921 and covering the years 1922-1929; and the third, published 1941, included 1930-1940.

Since the bound volumes of *Transactions* constitute a storehouse of practical, technical, and scientific data of essential interest to those engaged in the casting of metals, the new *Index* is an important reference work for ease of access to the technical articles.

As in past Indexes, page and volume numbers are noted in column heads at the top of each page. The authors' index is separated from the subject listing, and appears in the latter part of the volume. In cases of joint authorship, the article is cross indexed under the name of each author.

Sand Symposium

Third of the new publications is a paper-bound "Symposium on Foundry Sand Reclamation," a compilation of seven papers on the subject by experts in the field.

The Symposium consists of 48 pages, sized 8¼ x 11¼ inches. Titles contained in the paper include: "Development of Foundry Sand Reclamation," by C. E. Wenninger; "Reclamation of Sand by Pneumatic Dry Scrubbing," by H. W. Meyer; "Dry Reclamation of Molding Sand for Steel Castings," by J. A. Cannon; "A Wet Method of Sand Reclamation," by P. E. Will and R. H. Shurmer; "Sand Reclamation in a Steel Foundry," by H. H. Johnson, R. Y. McCleery, and G. A. Fisher; "Sand Reclamation With the Combination System," by G. H. Curtis; and "Sand Reclamation at Eddystone Plant," by K. S. Howard, and C. B. Jenni.

The purpose of the Symposium is to highlight the various methods of sand reclamation, and to indicate the possibilities and limitations of each. Instituted by the AFS Sand Division, the publication is a result of cooperative effort by the Sand, Gray Iron, and Steel Divisions of the Society.

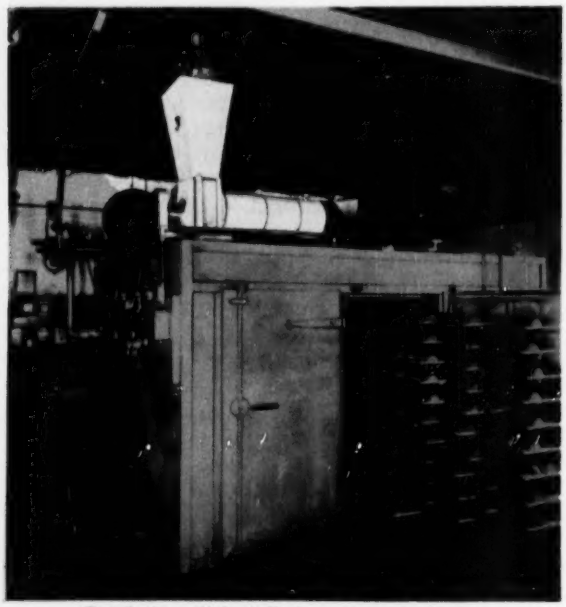
For full information on all of the new publications, inquiries should be addressed to: Book Department, American Foundrymen's Society, 616 So. Michigan Ave., Chicago 5, Ill.

Catalytic Combustion Control In Core-Baking Ovens

R. J. Ruff / *President, Catalytic Combustion Corp., Detroit*

R. J. Ruff

■ An explosion destroyed an oven in the plant of the Ensign Carburetor Co., Los Angeles, early in 1952. From an inspection of the parts remaining, it was concluded that the explosion was caused by a build-up of core oil vapor to the explosive range, rather than by raw gas or burner failure. Upon installation of a new rack type oven, studies were made of available methods of fume elimination, and to prevent recurrence of an explosion. As a result, a catalytic unit was installed on the exhaust of the oven. This consists essentially of a preheat burner at the oven outlet, exhaust fan, catalyst element, and stack outlet. The burner preheats the exhaust fumes from the oven to approximately 500 F, with the fan discharging the heated fumes through the catalyst and to the stack.



Catalytic unit installed on oven exhaust.

Exhaust ducts are now kept free of residue, there is no build-up of flammable or explosive gases, and color, odor, and eye-watering components of the oven exhaust have been eliminated.

Platinum-Coated Element

The catalyst, similar to an air filter element in appearance, consists of an alloy channel frame with an alloy mat enclosed in alloy screens. The whole element is coated with precious metals of the platinum group and conditioned for catalytic activity. When placed in an organic fume stream at 500 F, the catalyst causes chemical union of the combustible matter with oxygen. The oxidation occurs without flame, on the surface of the catalyst, and the latter does not enter into the end products of the reaction.

In effect, the catalyst causes low temperature burning of the vapors, even though their concentration is far below the lower limit of flammability—the minimum concentration for sustaining combustion by flame. Regardless of the fact that oxidation is accomplished at temperatures far below those required for flame combustion, the total heat of combustion of the consumed gases is released, and the end products are the same, usually carbon dioxide and water vapor.

Since the catalyst itself does not enter into the end products of the reaction, its life may be considered to be theoretically infinite. With fume streams essentially free of inorganic matter, catalytic units have been continuous operation for 15,000 hours, and several have accumulated over 24,000 operating hours without requiring service. Reduced activity life may be experienced where quantities of inorganic particles are present. Cupola exhaust, for instance, would be considered an inappropriate application for catalysis.

Control of Combustible Vapors

An advancement over normal oven safety control is accomplished through the control circuit of the fume combustion system, which automatically guards against reaching a hazardous concentration of combustible vapors in the exhaust stream. The oven itself is equipped with its own air flow switch, purging timer, flame failure protection and temperature control circuit.

The preheat burner for the catalytic unit is interlocked with the oven circuit, and has its own thermostat to control the temperature at the entry face of the catalyst. In addition, a separate thermostat is mounted on the discharge face of the catalyst, and connected to the safety circuit of the oven in such manner as to reduce the oven burner to pilot flame in the event the fume concentration exceeds approximately one-quarter of the lower limit of flammability. In this way, any unanticipated surges of combustibles released from the cores, results in decreased oven heat-input until the concentration has dropped to safe limits.

Here's how the high fume concentration protective circuit works. In a fume stream containing sufficient organic matter to release a single BTU of thermal energy in one cubic foot of air at 70 F (or the equivalent volume at other temperatures), complete oxidation will result in a temperature rise of approximately 57 F. Consequently, if the fume concentration amounts to 10 BTU/SCF—approximately one-quarter of the lower limit of flammability—a temperature rise of approximately 570 F is obtained.

Discharge Thermostat

With a controlled entry temperature to the catalyst of 550 F, a limit protector thermostat installed on the discharge side of the catalyst set at 1100 F can, therefore, provide protection against excessive concentrations as prescribed by insurance underwriters. On the Ensign Carburetor unit, this thermostat is arranged to reduce the oven burners to pilot operation at fuming rates beyond expected maximum, thus reducing the rate of release of vapors in the oven.

The limit protector thermostat is an indicating type, and provides, therefore, a visual guide in determining the minimum oven exhaust that could be permitted, with safety. Likewise, changes in production requirements that call for increased ventilation are immediately indicated. Oven and foundry engineers have customarily used rule of thumb methods in determining the ventilation volume for core ovens. With no convenient or precise method of measuring

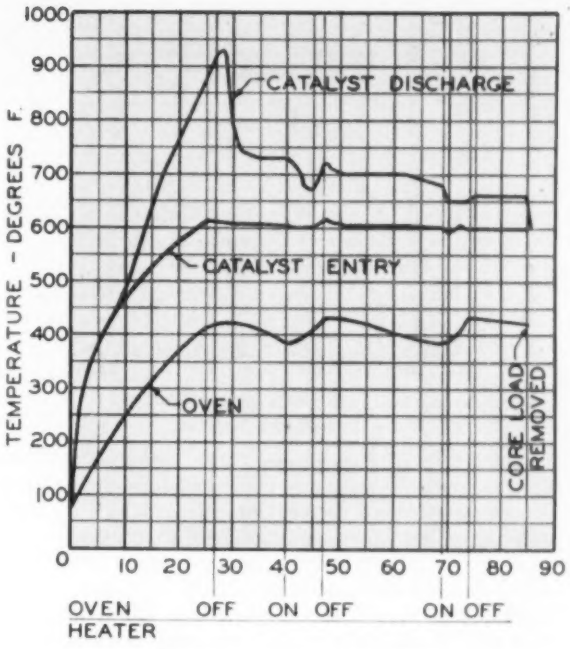
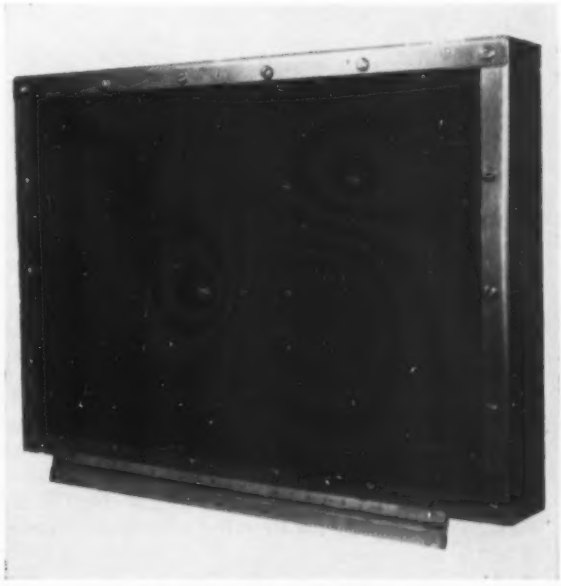


Figure 1



Close view of catalyst screen.

fume liberation rates, the tendency to install "enough" capacity, has in many cases resulted in exhaust ventilation far beyond actual requirements.

Temperature More Important

Contrary to popular conception, in recent years authorities have shown that the nature of the oven atmosphere is much less important than the temperature, and that sufficient air is always present in commercial ovens to supply the oil binder with necessary oxygen. Hence, ventilation can normally be held to approved insurance underwriter standards without

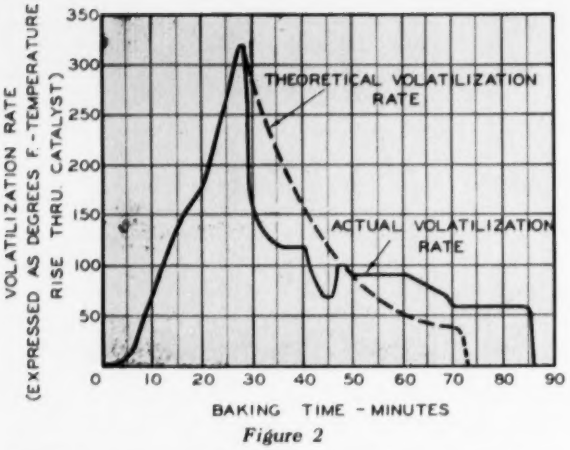


Figure 2

impairing quality of finished cores. Since as much as 60 per cent or more of the total heat input into a core oven is used for heating the air which replaces exhaust gases, it becomes evident that over-ventilation can be costly. For instance, for every 1000-CFM reduction of exhaust volume from a core oven operating at 400 F, the demand on the oven heater is reduced by 350,000 BTU per hour, and foundry make-up air requirements are proportionately reduced.

The heat release of the oven exhaust fumes through the combustion unit, and over a typical core baking cycle at Ensign Carburetor is illustrated in the photo. Starting with a cold oven, three fully loaded racks of green cores were placed in the oven. The cores were of the dry-sand type, four to eight pounds in weight, with maximum sectional thickness of approximately 4 inches. Total load for all racks included 770 lb of sand and 21 lb of a linseed oil-base binder. The oven and fume heaters were started. Simultaneous readings were taken of the oven temperatures, throughout the baking cycle. Quite aside from the fume combustion characteristics, these curves show several significant facts:

1. The release of volatile matter from the cores begins very quickly upon exposure to the heat of the oven.

2. The rate of release of volatile matter from the cores is profoundly influenced by a relatively small change in temperature.

3. Over one-half of the volatile matter is released from this particular core in the initial third of the baking cycle, and by the time the oven control setting of 420 F is attained.

The temperature rise through the catalyst, which is the difference between the catalyst entry and catalyst discharge temperatures shown in Fig. 1, is a function of the concentration of fumes in the exhaust stream. Therefore, by applying the proper ordinates, the "temperature rise" curve also represents the rate of release of volatiles. Proceeding on this basis, the volatilization rate curve shown in Fig. 2 has been prepared from the data given in Fig. 1. The dotted line is the theoretical release and shows reduced baking time that might be expected where oven and controls provide a constant 420 F core exposure.

Possibly, more extensive studies and wider application of catalysis to batch type core ovens can be expected to show volatilization rate curves as excellent direct indicators of minimum curing time for proper baking of cores. The data shown in this paper are, of course, specific, for the particular case described. For instance, it is obvious that wet-sand cores will have different volatilization characteristics. Thickness of core, type of binder, rate of heat transfer and control methods appear to be other major influencing factors.

Actual exhaust volume measurements have not been made at Ensign Carburetor Co. The volume was simply reduced to produce the "peak" temperature rise through the catalyst as shown on the curves in contrast to approximately one-third this "peak" with the original exhaust volume setting determined by conventional methods.

Installation Approved

Except for periodic inspection, no service was afforded the unit for the initial seven months of operation. For six months, stack gases remained free of color and noxious odors. The installation was inspected and approved by the Los Angeles Air Pollution Control District. During the seventh month, odors of partially-oxidized hydrocarbons became evident in the exhaust gases, and this was accompanied by reduced temperature rise through the catalyst. At the end of the seventh month, the original catalyst element was replaced and returned for inspection. It was found that an appreciable portion of the active surfaces of the catalyst was coated with silica powder and similar inorganics. Presently, the catalyst is scheduled to be replaced on an exchange basis every six months. It is believed that inorganic accumulation on the catalyst is more severe on rack type ovens as used for this initial installation, than would be encountered in a conveyor oven.

No heat recovery through return of heat from combustion of fumes after catalysis is planned or anticipated for the Ensign Carburetor installation. Because of the surging energy release from batch type ovens, it is questionable whether return of heat to a rack type core oven can be accomplished profitably, except in high fuel-cost areas. However, the oxidized gases in these cases could be profitably applied to preheating foundry make-up air during the heating season, thereby reclaiming much of the heat already invested in the fumes as they leave the oven, plus the additional heat from combustion of the fumes. The greatest potential for heat recovery lies in conveyorized ovens where the volatile release to the exhaust stream is at a more or less uniform rate.

Highest profitable return will be obtained where the oven design and baking operations permit reducing the volume of ventilation to the minimum consistent with safe operation. Exhaust volume reduction gives double return, since it reduces oven heating costs and increases the energy concentration of the fume stream, thereby producing higher catalyst discharge temperatures. Whether the added investment for catalysis on conveyorized core ovens may be justified on the value of heat recovery alone, as is accomplished in other fields, can be determined by full analysis of the individual installation by the oven builder and his engineering staff.

AFS By-Laws Revision Approved by Members

New provisions designed to aid in regional administration and liaison with local chapters, clarify membership regulations, reorganize Board of Directors . . .

AFS members overwhelmingly approved the first general revision of Society by-laws in five years when ballots were opened and counted on November 3 at Chicago.

The tallying was supervised by a committee of tellers consisting of: W. D. McMillan, International Harvester Co., Chicago, chairman; R. L. Doelman, Miller and Co., Chicago; and J. T. Moore, Wells Mfg. Co., Skokie, Ill. AFS Secretary-Treasurer W. W. Maloney also participated in the official computation of votes.

Out of a grand total of 268 ballots cast, the tabulated results are as follows:

Article	For	Against
I	2590	28
II	2549	67
III	2564	51
IV	2575	40
V	2545	69
VI	2579	35
VII	2570	46
VIII	2576	34
IX	2581	32
X	(not revised)	
XI	2539	61
XII	2575	33
XIII	(not revised)	
XIV	2580	27
XV	2582	27
XVI	2580	27
XVII	2578	25
XVIII	2575	33
XIX	2481	26
XX	2583	28
XXI	2579	28
XXII	(not revised)	

The newly revised by-laws result from endorsement at a meeting of the Board of Directors on July 24, although individual proposals had been under study for several years in some instances.

The two principal revisions concern reorganization of the Board of Directors (Article V), and a new regional organization for local Chapters (Article VII).

Regional Plan

As now approved, the revised Article VII establishes five regions and 18 Chapter groups. Although the number of groups in each region are not necessarily the same, each group of Chapters will have constant representation on the Board under the new plan. Further, a Regional Vice-President will be appointed by the Board for each region, being selected from among the National Directors in each region.

Under the new establishment, the National AFS President and Vice-President will be relieved of considerable travel time on official business, a load that has proved severe in the past. The five Regional Vice-Presidents will function as official representatives of the Society in their respective areas. Regional administration should also result in more effective liaison with National Headquarters.

A complete listing of regions and Chapter groups appeared on page 49 of AMERICAN FOUNDRYMAN for October, 1953.

Board Changes

The new regional administration plan necessitated a major alteration in the structure of the Board of Directors. The Directorate will now be increased form 18 to 24 members, including the President, Vice-President, immediate past President, and 21 Directors. A Nominating Committee will name 18 of these Directors for election at the Annual Convention. This Committee will meet on December 11, 1953, and will be guided by the new by-laws revisions. These 18 Directors will be chosen from the regional groups, each of which will have constant representation in the future.

The remaining three Directors will be chosen at large by the Board with the purpose of obtaining qualified men of broad administrative experience who are otherwise unable to participate actively in Chapter and committee work. One of these Directors will be appointed annually for a three-year term.

Membership

Article II revises membership qualifications, creating a new Junior Membership with a single 25-year age qualification. The old Student and Apprentice membership class is replaced by this clause.

Two other revisions will affect the AFS Board of Directors. Article V now provides that newly elected National Officers and Directors will take office immediately after the Annual Convention. In the past, they have been inducted into office at the Annual Board Meeting, some three months after the elections.

This Article also enables the Board to hold its Annual Meeting 90 days following the close of the fiscal year on June 30, relieving the former situation when the Meeting was held 30 days later.

The new by-laws revisions in no way affect membership dues, and no change of any kind is under consideration at this time.

New F.E.F. Booklet

The Foundry Educational Foundation has published a sturdily bound, paper covered 106-page booklet summarizing its 1952 College-Industry Conference.

The volume contains reprints of the principal addresses and papers of the Conference, and transcripts of panel discussions.

Four Sections

Following a review of the Conference activities, the booklet is divided into four sections: major addresses, use of engineering talent, recruiting and training of engineers, and college and university activity.

The articles are well illustrated throughout with reproductions of photographs, charts, and line drawings. Further information about the publication can be obtained from the F.E.F. offices, Terminal Tower, Cleveland 13, Ohio.

Use of Gamma-Ray Emitters For Industrial Radiography

HERBERT R. ISENBURGER / *President, St. John X-Ray Laboratory, Califon, N. J.*

H. R. Isenburger

■ With increased adaptation of more radioisotopes to radiographic inspection of castings, more and more of these isotopes are being used in the castings industry. Considering that the average x-ray installation costs ten times more than an equivalent radioisotope setup, and that the upkeep, including operating personnel, is several times less for the gamma-ray source than it is for x-ray units, the latter are being rapidly supplemented and in some instances replaced by one or more gamma-ray emitters. Table 1[1] outlines the advantages and disadvantages of the two types of radiographic facilities.

Table 1—COMPARISON BETWEEN RADIOISOTOPES AND X-RAY UNITS.

Radioisotopes	X-Ray Units
Advantages	
Can be shaped to any desired form before being activated	Shorter exposure times
Small and light, easy to handle	
Can readily be transported and used when and where needed	
Do not require attention during exposure	
Can expose a number of objects simultaneously (carrousel exposures)	
No scattering effect to be considered	
Irregular objects can be exposed without additional build-up	
No electrical hazards	
Disadvantages	
Cannot be turned off	Great expense
Less contrast	Great bulk
	Repair and upkeep cost
	Require power supply
	Skilled operators

A substantial number of gamma-ray sources are available today and more will be developed as time goes on. The sources from which suitable material for inspection of almost any type of casting can be selected are tabulated in Table 2[1].

For best radiographic results, at the present, iridium 192 is used on steel castings ranging in thickness from 1/16 in. wall to two inches and above that thickness cobalt 60 is employed. A recently developed exposure technique—calcium tungstate screens in conjunction with a special filter set—greatly increases the commercially possible thicknesses to be penetrated. The filter-set consists in the main part of lead, up to ¼ in. thick, and another high-atomic weight material to absorb the undesirable K α lead radiation which otherwise would tend to fog the image in the gammagraph. The filters are placed between the object under exposure and the film. Thus it requires an exposure of 12 hours to obtain gammagraphs through five inches of steel with a 500 millicurie source of Co^{60} at 36-in. focus-film distance, using lead foil and a medium-speed no-screen type film[2]. The same exposure with the new technique requires but two hours, and in 12 hours 9½ in. of steel can be radiographed, employing a filter cassette and salt screens with screen type films.

Iridium 192 is especially useful for short-distance work, inside valve bodies for instance. While its half-life is short (74 days), it can be reactivated. It is sound

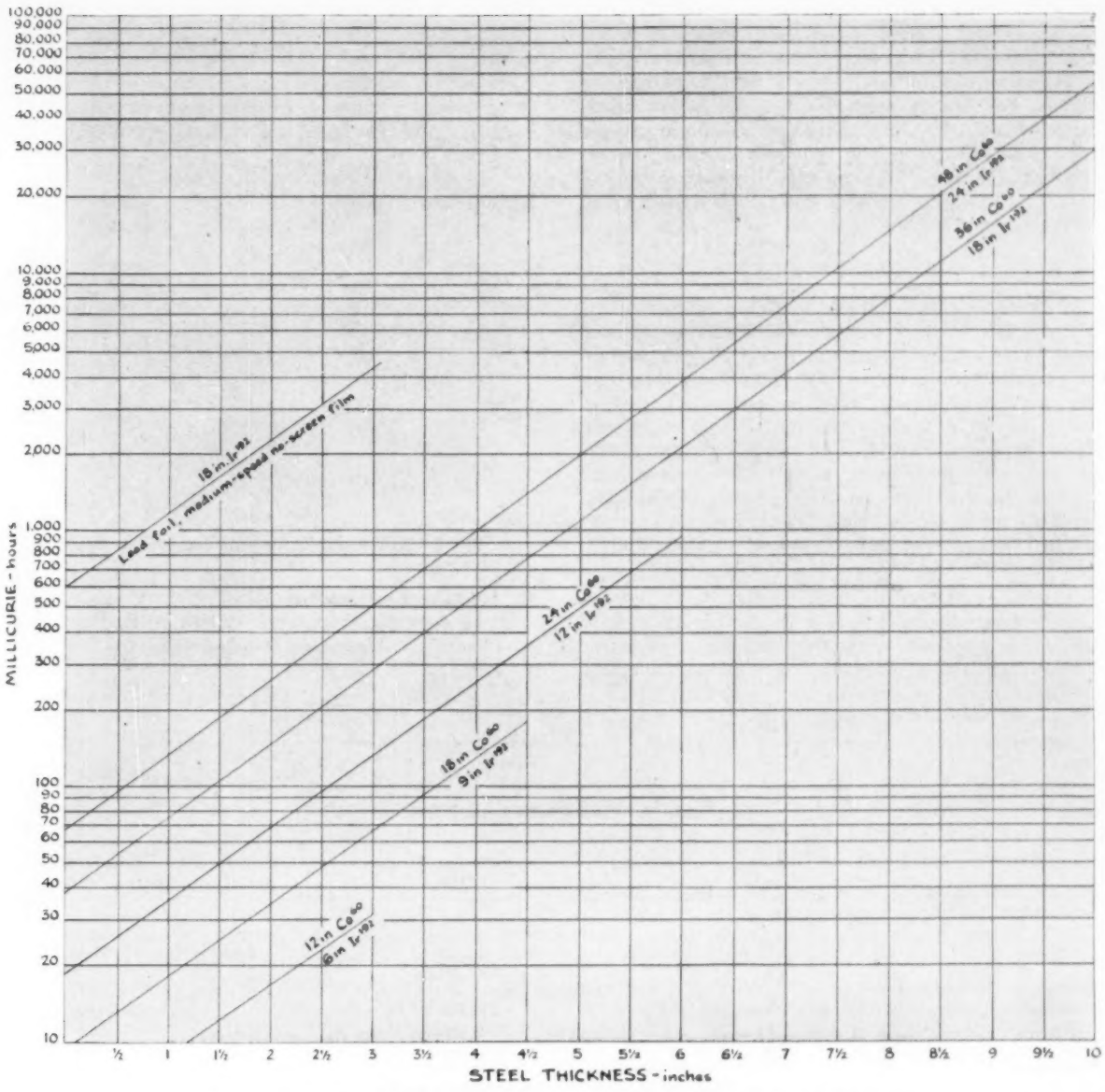


Fig. 1—Exposure chart for radiographs made with cobalt 60 and iridium 192.

practice to use three sources in rotation; while one is in use, the other two are in transit and being processed. A suitable source of Ir^{192} has an activity of two curies with a pellet size of 1 x 1 mm. It must be produced in a position of high intensity flux to provide satisfactory radiation.

Figure 1 gives exposure charts for focus-film distances of from 12 in. to 48 in. for cobalt 60, employing the new technique, and from 6 in. to 24 in. for iridium 192. The time saving of this new method is evident from a comparison of the two exposure curves for Ir^{192} at 18 in. distance. Whereas the old method required a little over one hour for two inches of steel with a two curie source, the new one takes but two minutes.

A promising new isotope is cesium 137, an uranium fission product. The sources are approximately 2 mm in diameter and contain about 200 millicuries of Cs^{137}. The 37-year half-life is a great advantage and its gamma radiation resulting from its short-lived twin barium 137, is monochromatic (0.662 Mev). Cesium 137 is generally considered to be the most promising isotope for future industrial applications. However, it is not possible, at present, to get as much activity into a small source as is possible with iridium 192, and, although the maximum gamma energies are roughly the same for cesium and iridium, there is a considerable soft spectrum given off by iridium, which allows it to be used for a greater variation in thickness than in the case of cesium.

One of the great advantages the isotope method has over x-ray inspection is the fact that, space

permitting, no lead partition is required for protection against hazardous radiation. Figure 2 shows the distance to be roped off without necessitating any other safety precautions. Thus it is safe to remain 35 feet from an exposed cobalt set-up of 500 millicuries whereas the same amount of iridium or cesium requires but 15 feet. A two curie source of Ir^{192} on the other hand requires about the same distance as the 500 millicurie source of Co^{60}. A 200 millicurie source of Cs^{137} requires but nine feet.

Monitoring Practices

If exposures are made in the open foundry shop where other work is going on simultaneously, it is good practice to monitor the roped-off area similar to personnel monitoring with film badges, except that the operators wear their badges for a period of one week each, whereas the environment monitors should be processed and evaluated after a day's work. In that way, positive proof can be obtained and kept on file that no appreciable amount of radiation reached the sensitive film. Thus less could have reached personnel working outside the roped off area.

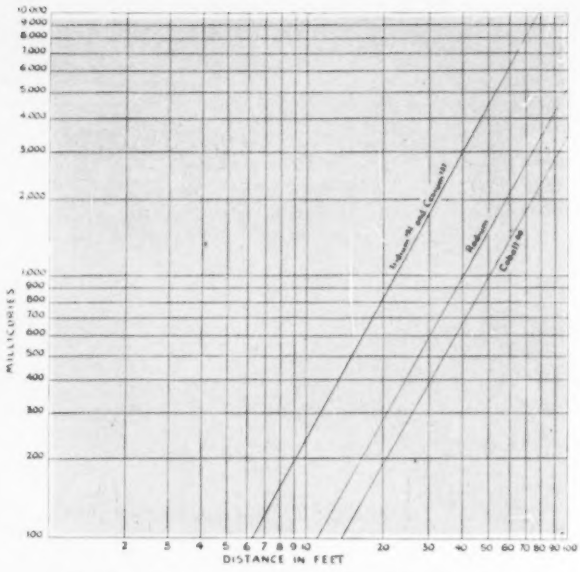


Fig. 2—Safe distance for radioactive materials.

References

1. From an article in *Industrial Radiography* which the author prepared for the *Encyclopedia of Chemical Technology*. Vol. 2. Reprinted here through courtesy of Interscience Publishers, Inc., New York.

2. Herbert R. Isenburger, "Cobalt 60 Radiography of Castings," AMERICAN FOUNDRYMAN, vol. 18, no. 1, 1950, pp. 48-49.

Table 2—GAMMA-RAY EMITTERS.

Element	Atomic Number	Mass Number	Half-Life	Gamma-Ray Energies Mev	Output/mc mrhm/mc	Useful Thickness Range, Steel in in.
HIGH ENERGY						
				Natural		
Radium	88	226	1620 yr	0.24-2.42 (0.7 mean)	0.84	½-6
				Radioisotopes		
Sodium	11	24	15 hrs	1.38 and 2.758		1-10
Scandium	21	46	85 days	0.89 and 1.12	1.1	¾-6
Cobalt	27	60	5.3 yr	1.17 and 1.33	1.3	¾-6
Antimony	51	124	60 days	.6(95%).714(24%) 1.7(70%)2.06(6%)	1.2	½-6
Tantalum	73	182	111 days	.152(2%).222(4%) 1.189(37%)1.225(57%)	0.61	¾-6
Europium	63	152,154	13 yr	0.12 to 1.2	.055	½-6
Cesium	55	134	2.3 yr	.568(25%).602(100%) .794(100%)	1.15	½-3
MEDIUM ENERGY						
Zinc	30	65	250 days	1.14	0.30	½-3
Antimony	51	125	2.7 yr	0.035 to 0.637	0.72	¼-2
Cesium	55	137	37 yr	0.662 Beta:1.2(5%) and .51(95%)	0.37	⅛-2
Iridium	77	192	74 days	0.137 to 0.651 (0.35 mean)	0.27	⅛-2
Selenium	34	75	127 days	0.067 to 0.405	0.30	¼-1 ½
LOW ENERGY						
Cerium	58	144	290 days	0.13 (strong)		aluminum
Thulium	69	170	127 days	0.085(10%);Beta:0.97	0.0045	aluminum

1. Recommended lead thickness for shipping containers: Co^{60} : 3 in. Pb up to 250 mc; 4 in. Pb, 300-500 mc; 5½ in. Pb, 500 mc to 1c; Ir^{192} : ½ in. Pb up to 500 mc; 1 in. Pb, 500 mc to 2 c.

2. Greater thicknesses may be penetrated successfully by using larger amounts of Ra, Co^{60} or Ta^{182}, but these require remote control handling devices for safe operation.

Exhibitors for 1954 Show Making Early Reservations

FOUNDRY equipment manufacturers and suppliers are responding to the 1954 AFS Exhibit in record numbers. The biennial cast metals industry show will be held in the Public Auditorium, Cleveland, during the week of May 8-14, in conjunction with the 58th annual Convention of the Society.

The prompt return of exhibit space applications substantiates the anticipated interest on the part of prospective exhibitors. With more than 100 requests for exhibit space received in less than two weeks after the original mailing, over one-third of all available floor space will be allocated. Such enthusiastic response by members of the foundry industry insures that foundrymen from all divisions of the field will see the most advanced machinery, equipment, and production techniques.

A Burning Desire

Nation-wide interest in the Foundry Show, of course, is nothing new. Many foundrymen will recall that, when a California firm's application for exhibit space was rejected in 1952 because all standard booth area had been allocated, they refused to take a negative answer.

Attaching a trailer to a new Cadillac, the president and his partner loaded a treasured piece of equipment and made the rough 2,800-mile highway trip to Atlantic City.

The travelers were road weary when they arrived shortly after the Show opened, and the jarring did not add a satiny-smoothness to the finish of the machine they hoped to exhibit. It was a bitter disappointment, therefore, to have the original rejection repeated. "There just isn't a foot of regular exhibit space available," AFS exhibit managers were forced to tell the persistent Californians.

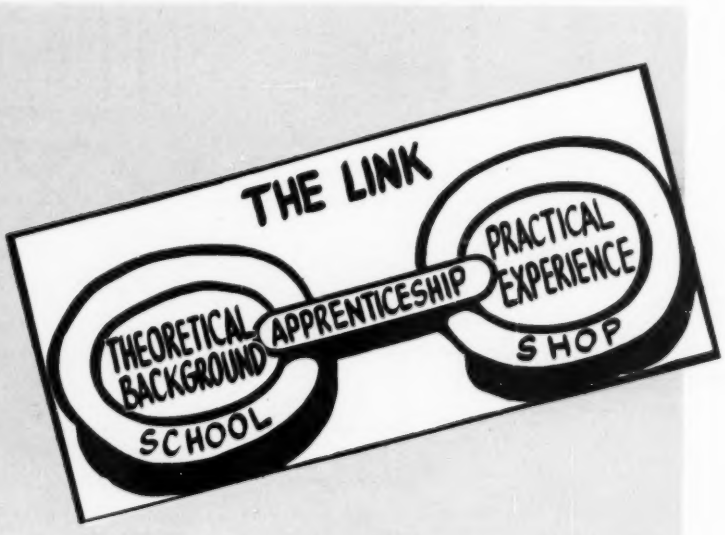
Undaunted Exhibitors

But American businessmen are seldom daunted, so a corner opposite the men's washroom was soon converted into booth space. Show painters quickly had the equipment sprayed a glistening yellow, the sign makers let the 13,000 foundrymen in attendance know that the Blastcrete Equipment Co. was a participating exhibitor. Ira Ridley, president of the firm, was delighted with AFS cooperation.

Cost Committee Seeks Questions

The chairman of the AFS Cost Committee requests that persons with specific, pertinent questions on foundry cost submit them for use at a question-and-answer session at the 1954 Convention. Address R. L. Lee, Chairman; AFS Foundry Cost Comm.; c/o Grede Foundries, Inc.; P.O. Box 443, Milwaukee.

Foundry Industry Looks At Apprentice Training



R. G. GREINER / *Mgr., Training Dept., Allis-Chalmers Mfg. Co., Milwaukee*

R. G. Greiner

Human side of business interests industry more and more. It is a broad field which presents many problems and few answers. This view of apprentice training was presented at the 16th Wisconsin Regional Foundry Conference.

■ Training is an important phase of human relations, and is vital for the survival of the country's industrial economy. In the years immediately ahead, the importance of training will be recognized more and more, and much time and money will be spent to make it more effective.

Apprentice training is the oldest and best known type of industrial training. Industry and commerce have depended on apprentice training for centuries to transmit the skills. In spite of the rapid development of formal education, apprentice training has not been supplanted.

In past centuries during the handicraft period, people were dependent upon the skilled craftsmen to produce certain goods. The skill necessary to make the goods was handed down from generation to generation through apprentice training. Today, through standardization of parts and the development of machines, many of the processes have been broken down into small segments which the worker can learn in a matter of days or weeks. Nonetheless, there are still operations in the making of goods that require the skills of highly trained craftsmen. This small group of skilled craftsmen is depended upon to keep the wheels of industry moving. Since industry, is so dependent upon the skill of these craftsmen it must assume the responsibility of providing means whereby the demand

can be supplied. This can be done, by industry, through a well-organized apprentice training program. Working under the supervision of craftsmen the young men learn the skills so vital for industry.

Source of Supervising Personnel

Industry depends upon certain men to assume the responsibility to carry on the daily operations. These men who have assumed the responsibility are the leaders or the management of an industry. It is upon management that industry depends for the continuous production of goods.

It is important for industry to have a reservoir of

men to draw from, to fill the positions in management. The men who have received a broad training in the various operations of the manufacturing process are one source upon which to draw. This is practically the only source from which to recruit first line supervisors. It is important that the first line supervisor have the skills required to carry on the work of his department. The person best qualified is an individual who has received a broad training as an apprentice. Furthermore, it is required of the first line supervisor that he be able to instruct, reduce cost, and to carry on the paper work. The individual who has served an apprenticeship is usually best qualified, since he was selected for apprentice training because of his superior qualifications. Industry, by selecting men for supervisors and foremen from the apprentice ranks, draws upon the men with outstanding ability which it has trained.

Industry, to remain in operation, must place a high quality product upon the market. Consumers will purchase those products which give them the greatest value for their money. Industry must rely upon trained men to produce goods of high quality. High quality is assured, if properly trained men are placed in key positions in the production of goods. To have a steady supply of qualified workers to fill the key positions, industry must rely upon a well organized apprenticeship program.

Apprentices influence to a great extent the quality of the goods produced. It is the responsibility of industry to teach the apprentice to recognize the need for quality. Through a well organized apprentice training program, industry can show the apprentice that quality is of the greatest importance in a product, and that the consumer on the competitive market buys the product

Iron Molder Apprentice

WORK PROCESSES

Molder helper (OPTIONAL: SAND MIXING)	924 hrs.
Core room and sand lab	700 hrs.
Green sand molding (LIGHT WORK)(Optional mechanical molding)	1500 hrs.
Green sand molding (HEAVY WORK)	1500 hrs.
Dry sand molding (LIGHT WORK)	1400 hrs.
Dry sand molding (HEAVY WORK)	1400 hrs.
	7424 hrs.

RELATED CLASSROOM CURRICULUM

Technology –	SAFETY, PATTERN & CASTING DESIGN, TERMINOLOGY, MOLDING METHODS, EQUIPMENT, COREMAKING, METALLURGY	129 hrs.
Mathematics –	PERCENTAGES, WEIGHT-LUMBER-MIXTURE-AREA CALCULATIONS	75 hrs.
Drawing –	FUNDAMENTALS OF PROJECTION, INTERPRETATION OF SHOP DRAWINGS	54 hrs.
Science –	MATTER & ENERGY, STRENGTH OF MATERIALS, HEAT, ELECTRICITY & MAGNETISM, MECHANICS, CHEMISTRY	54 hrs.
Related Shop –	FOUNDRY-SAND CONTROL, INSPECTION & TESTING OF METALS, HEAT TREATING	174 hrs.
Appr. Problems –	JOB RELATIONS, ECONOMIC RELATIONS	54 hrs.
Assembly –	SLIDES, MOVIES, LECTURES, DEMONSTRATIONS	36 hrs.
		576 hrs.

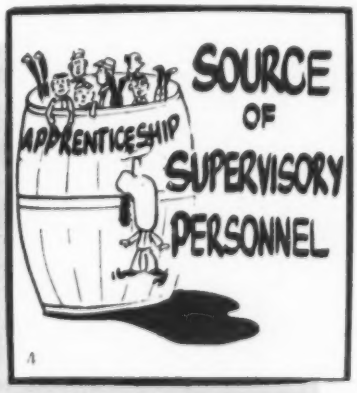
Grand Total ____ 8000 hrs.

How should the apprentice be trained to take his place as a craftsman in the foundry industry? This chart suggests both practical and theoretical curricula.

that gives him most for his money. If an apprentice has become aware of the needs for the highest quality in the product, it is certain that the apprentice will develop the awareness of that need.

In a competitive economy, every reduction in cost, no matter how slight, may be the difference between whether the company will operate at a profit or in the "red." Apprentices are often in a position to develop short cuts which will lower the production cost. The apprentice must be trained, to be constantly alert to any possibility of reducing the cost in his department in actual production.

Scrap is a problem in every shop and overhead due to scrap can mean the difference between operating at a profit or at a loss. Apprentices properly trained can reduce scrap and thus reduce the cost of running the department. If the apprentice has been trained to work carefully,



Patternmaker Apprentice

WORK PROCESSES

Shellacking and work relating to trade	240 hrs.
Small patterns, shellacking & work relating to trade	379 hrs.
Small patterns, turning, and work relating to trade	1237 hrs.
Medium patterns and core boxes	1856 hrs.
Foundry work	500 hrs.
Medium patterns and core boxes	1356 hrs.
Large patterns and core boxes	1856 hrs.
	7424 hrs.

RELATED CLASSROOM CURRICULUM

Technology – SAFETY, TERMINOLOGY, MOLDING PROCEDURES, PRINCIPLES OF PATTERN CONSTRUCTION, EQUIPMENT, ELEMENTARY FOUNDRY PRACTICE	135 hrs.
Mathematics – BOARD MEASURE, VOLUMES, WEIGHTS, TAPERS, PERCENTAGE	54 hrs.
Drawing – FUNDAMENTALS OF PROJECTION, INTERPRETATION OF ORTHOGRAPHIC DRAWINGS, PATTERN LAYOUT	270 hrs.
Appr. Problems – JOB RELATIONS, ECONOMIC RELATIONS	54 hrs.
Science – CHARACTERISTICS OF LUMBER, GLUE & SHELLAC, MECHANICS	27 hrs.
Assembly – SLIDES, MOVIES, LECTURES, DEMONSTRATIONS	36 hrs.
	576 hrs.

Grand Total — 8000 hrs.

Much of the suggested training for the pattermaker's apprentice will parallel that of the iron molder. Important differences occur in classroom curriculum.

and to follow blueprints closely he will not only avoid scrap, but the quality of the product will be enhanced.

To meet competition and remain in business, it is necessary for industry to make certain that its product is as good as, or better than, that of any other competitor in the same price range. A well-qualified apprenticeship is necessary, therefore, if an industry is to keep up with modern developments. To meet the demand for well-trained and well-qualified apprentices, many industries (especially the larger ones) have developed apprenticeship training programs.

In general, the young apprentices coming from our

high schools have an excellent theoretical and technical background, but they may lack the practical experience which they must possess if they are to be of any real value to industry. This practical experience can be acquired only by actually doing the work of an apprentice in a given industry under normal working conditions, and by performing enough of the related jobs to provide a thorough knowledge of overall plant operations.

It is often a long and painful process, for the young apprentice, to get this necessary practical knowledge if he is not given assistance. The link between theoretical background that the apprentice has acquired at high school and can acquire at a vocational school, and the practical experience that the apprentice receives in the shop apprenticeship.

The well-organized training programs found in industry enable the young man who is an indentured apprentice to acquire a broad training in the field in

which he is working. This is still one of the best ways of learning a skilled trade. Men with skilled trades have many advantages over the unskilled employee. The skilled employee has greater job opportunities because industry will select men with the greatest skill. The skilled employee is a productive employee as soon as he is hired. Industry need not teach him the operations he is to perform. The unskilled employee must first be taught how to do the job; this is costly for industry. It is only natural that the skilled craftsman will be given preference over his unskilled brother.

On the job, the skilled craftsman has greater job security than the unskilled or semi-skilled employee. When jobs are scarce, the skilled man with a broad training in all phases of work will not be laid off as quickly as the unskilled. Industry can move him from one type of work to another and the various jobs can be handled with equal ease.

The employee, to support himself and his family, must sell his services. The services of a skilled employee are in greater demand and at a higher rate than that of the semi-skilled or unskilled. The employee who has learned a trade will earn the top rate in his work group. Apprentice training is the best assurance to reach the top earnings for the job.

People like to work for a company that is prosperous. A prosperous business must be one that produces a product for which there is a demand. To achieve this, it is necessary to combine good design and latest developments in research. A business that is prosperous must be under good management. Combining a product that sells with good management is quite certain to insure prosperity for the company. From the employee viewpoint, an industry operating at a profit is a desirable place to work. It is likely to give greater job

security, steadier work at better earnings, and may well offer greater opportunities for the advancement of the employees.

To develop and maintain an industry that will offer such ideal working conditions for the employees, it is necessary that industry train men continually. Both

employer and employee should be keenly interested in apprenticeship training programs since such programs tend to produce conditions advantageous to both.

Opportunity for Self-advancement

The acquiring of new skills broadens man's opportunities for self-advancement in the industry in which he is working. American tradition indicates that anyone with ability and determination can, by his own efforts, get ahead in the world. Although it may not

be admitted, the thought of becoming a foreman has a great deal of appeal to most apprentices. The apprenticeships offered by industry thus help to give the apprentice a chance to realize his ambitions.

In modern systems of job evaluation, the skill required on a job plays an important part in distinguishing one labor grade from another. It is not difficult for the employee to see that in acquiring new skills, he is increasing his opportunity to advance from one labor grade to another, thus increasing his earning power. This is still the greatest incentive for work.

Apprentice training besides serving industry and labor, renders a great service to the community. An important result of apprentice training that is often overlooked is the resistance of highly skilled employees to radical and subversive ideas. The skilled employees pride themselves in good workmanship, home ownership, and participation in civic and community affairs. Their sense of value makes them appreciate the American way of doing things. They have little sympathy for the "something-for-nothing" philosophy.

Pennsylvania State College Offers Adult Courses in Steel Metallurgy

A program for adult instruction in steel foundry metallurgy is being offered by Pennsylvania State College, either in classroom or correspondence form. It is designed to provide a groundwork of theory for persons without formal metallurgical training.

The recommended sequence of courses includes, "Introduction to Ferrous Metallurgy," "Control of Modern Steel Foundry Operations," and "Physical Ferrous Metallurgy."

The introduction course includes fundamentals of chemistry-pyrometry, combustion of fuels, refractories, and theory of blast furnace operation. The second course covers steel foundry melting techniques and quality control; sand control; hot tear formation; sand metal reactions; gases in steel; porosity and inclusions; solidification of steel castings; gating and risering; properties of cores; effect of molten steel on cores and mold wash; and inspection of castings.

The ferrous metallurgy curriculum lists constitution, properties, and heat treatment of carbon steels; and effect of alloying elements on properties of steel.

Each of the courses is available either through classroom instruction in Pennsylvania, or by correspondence to persons either in or out of the state.

Classes in Pennsylvania may be organized under direct control of the school board of the district, where 20 or more men request a course. Classes may also be organized by a company, in which case all arrangements, instructor selection, and other details are worked out between the College and the firm served. The sponsoring company pays the instructor under this arrangement.

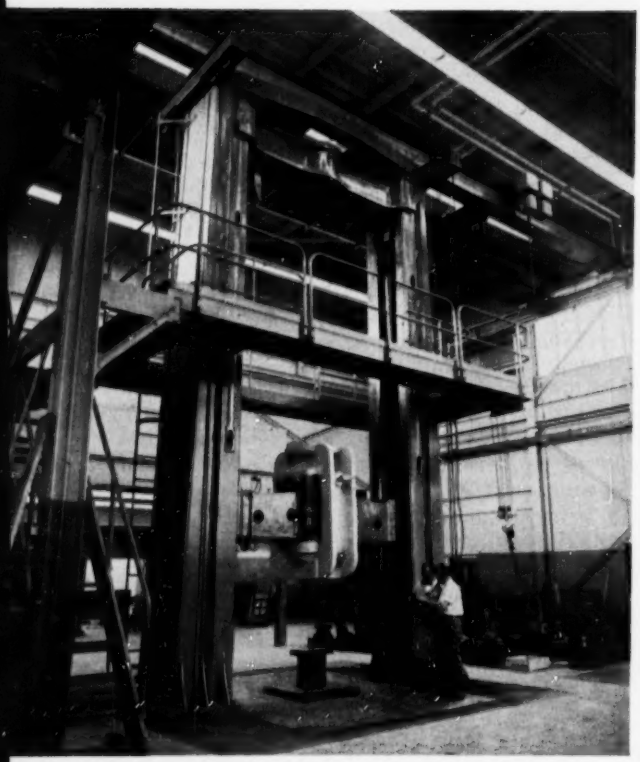
Correspondence instruction may be obtained at any time of the year. A student is allowed one year in which to complete *each* of the three courses offered in the program. The courses listed are non-college credit, and a separate text book is used for each. The fee for each of the correspondence courses is $30 plus the cost of the textbook.

It is possible to organize a supervised study class for a group of correspondence students who are working at a single plant or locality.

Persons desiring information may address a letter to L. F. Haller, Associate Prof. in Charge, Mineral Technology Extension, Pennsylvania State College, State College, Pa.

Modern new technical center of National Malleable and Steel Castings Co. at Cleveland was opened in June. Designed as a facility for product engineering, research, and testing, the center is equipped with an inclined proving ground where passenger and freight cars will be given extensive impact tests.

New Research Center Opens



This one million lb capacity testing machine is capable of applying either tension or compression loads, as required. An electrically-operated moving platform aids in setting up tests in National's new technical center.

NATIONAL Malleable and Steel Castings Co., culminating 85 years in the metal castings industry, recently dedicated a new technical center adjacent to its Cleveland Works.

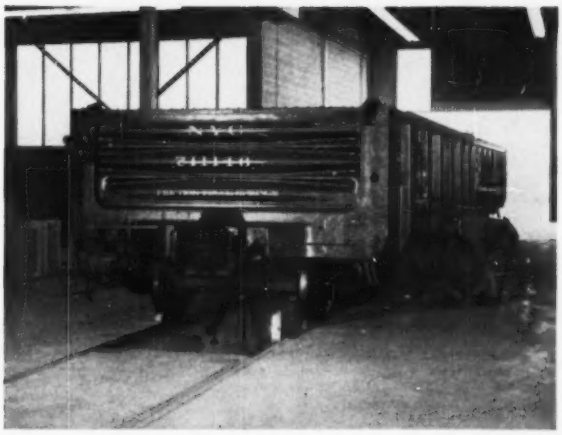
The new research facility is designed to aid in product engineering, development, and testing in the company's product fields, which include railroad and automotive equipment, ship gear, and mining machinery. National has been particularly active in the design and production of railroad trucks, couplers, and draft gears.

Comprising four coordinated sections, the technical center includes: 1) Extensive physical testing laboratories, equipped with a wide range of mechanical and electronic testing and recording devices; 2) An engineering department which develops products, plans production methods, and provides technical services for customers; 3) A proving ground, with car pits, test tracks, and company-owned, specially-equipped railroad and mine cars; and, 4) Administrative quarters and meeting rooms.

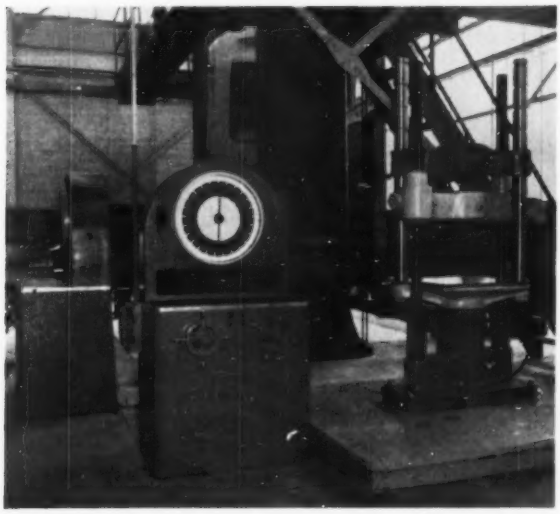
The center is built of concrete, brick, and stainless steel panels, with generous window space. The building is constructed on a 5.7-acre plot and has 36,850 sq ft of usable floor space. It is completely air conditioned, ventilated, and illuminated with the most modern lighting fixtures.

Largest single item among the test equipment is a one million lb static testing machine which is said to have the largest testing clearance of any machine its size yet built. Reinforced concrete extensions provide for testing unusually long specimens. All test loads are measured with an accuracy of $\pm$ ½ per cent.

Other testing machines include a 27,000-lb drop



This railway car inspection and servicing pit is part of National's proving ground, and is used for under-car inspection, instrumentation, and testing. The pit is built indoors in the Cleveland technical center.

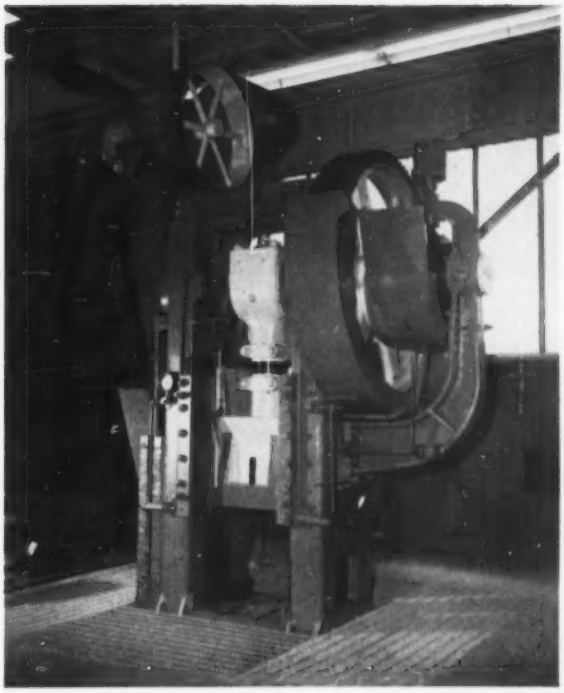


Small specimens are tested on this machine, which can apply loads up to 120,000 lbs in either tension or compression. Load and deformation are both recorded.

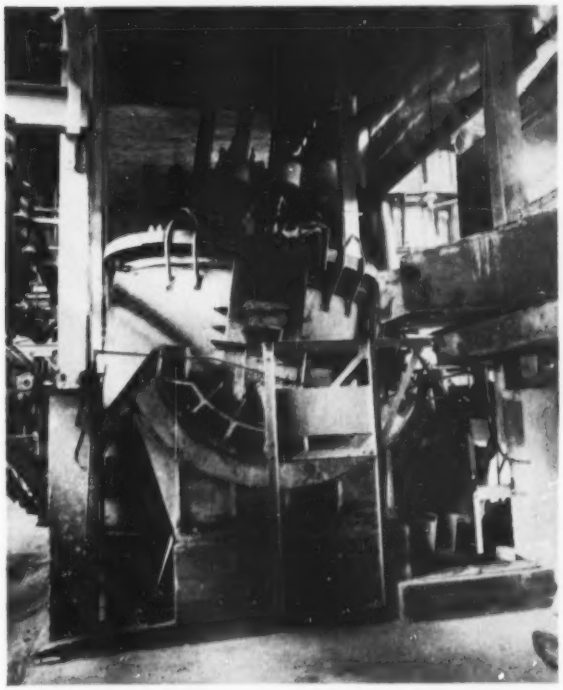
machine, a 120,000-lb static tester and a 1,640-lb drop test. Dynamic fatigue test equipment and special units for testing wheel and journal bearings, and coupler angling and creep, add to the flexibility of the technical center.

Inclined Proving Ground

The proving ground is built on an inclined area outside the main technical center. It has been constructed on a 12 per cent grade, 21 ft high and 195 ft long. Impact speeds up to 22 mph can be reached. The tracks will handle either standard gauge railroad equipment, or the narrow gauge cars used in mining operations. An automatic releasing device frees the impacting car on the incline, allowing it to roll into a standing car at a predetermined speed. The stationary car is equipped with the devices to be tested. Cars are retarded after impact by air brakes, rail skids, and the safety incline of the test track.



Used for fatigue testing and for breaking-in friction surfaces, this 600,000-lb capacity press has a 4-in. stroke and operates at speeds of 7 strokes per minute.



Typical of the large-scale foundry operations at the adjacent Cleveland Works of National Malleable and Steel Castings Co. is this tilting-type electric arc furnace, which refines and super-heats 25 tons of white iron per hour from the cupolas. Principal product of the works is malleable iron castings for the automotive trade.

Repairing Conveyor Belts

A. F. Matheis / *Asst. Vice Pres., Thermoid Co., Trenton, N. J.*

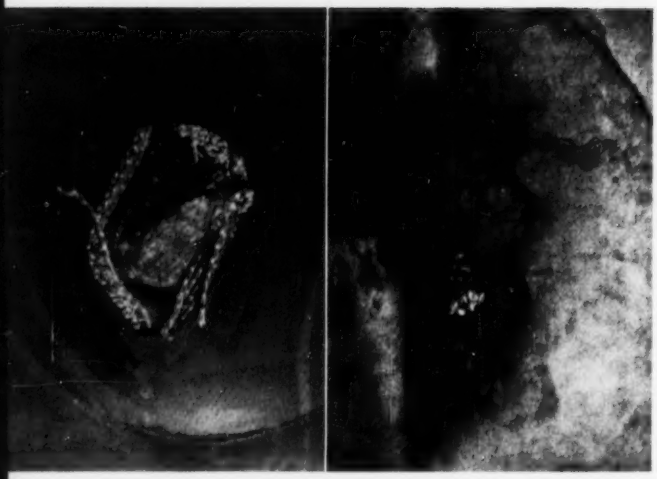


Fig. 1 (left)—Puncture made by piece of cast metal. Fig. 2 (right)—Appearance of belt after piece of metal has been withdrawn and belt taken to repair shop.

A. F. Matheis

SIMPLE tools and procedures will help the maintenance man to give conveyor belting proper attention. An adequate repair kit includes sharp cobbler's knives and a stone to keep them sharp; a supply of emery cloth, rubber cement, inner tube patching rubber, rip plates and standard belt fasteners and accessories, together with rags and gasoline for cleaning. As each belt is installed, remnants should be saved, since they will prove useful in subsequent repairs.

Mending Deep Cuts

To mend long, deep cuts which go through to the fabric, open the cut, clean out all dirt, and cement the cut closed, allowing the cement to dry thoroughly before the belt is restored to service. Where bits of torn cover leave exposed spots with only slight damage to the fabric, remove the loose ears of cover stock by carefully cutting a curved and bevel-edged area around

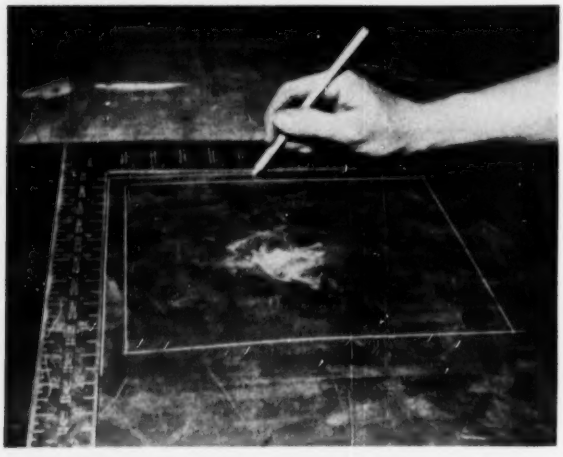


Fig. 3—Section of belt to be removed is carefully marked with square. Section should be large enough to completely encompass damaged area after series of cuts.

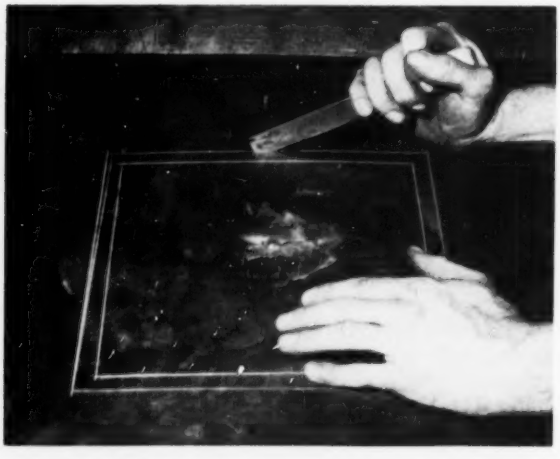


Fig. 4.—Thin strip about ½-in. wide is marked out inside large square. Cover of belt is then cut through to first layer of fabric with sharp cobbler's knife.

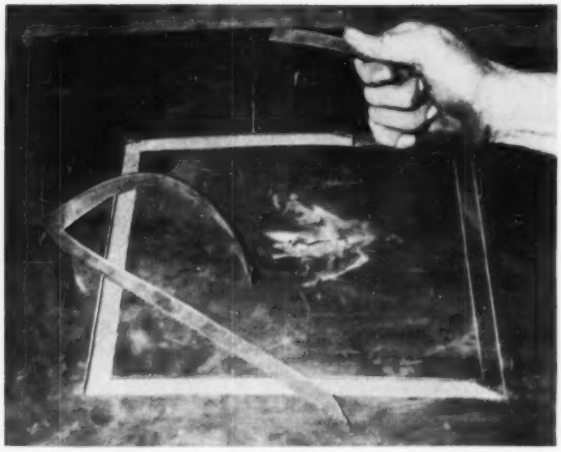


Fig. 5—After cutting, thin strip is pulled off.

the spot; then sand the edges, apply the patch flush with the belt cover.

In cases where gouges have penetrated the belt, or longitudinal rips have occurred, these points must be cleaned, sanded, cemented and reinforced with rip plates at three-inch intervals. Transverse rips require similar treatment with standard belt fasteners instead of rip plates. Use rip plates on longitudinal rips only, and standard fasteners on transverse rips only (Fig. 13). When holes in the belting do not permit the simple use of rip plates and fasteners, cut out the hole into the smallest possible rectangle with its sides parallel to and at right angles to the belt edges. Then, from belting remnants, cut an exact fit for the hole and insert the piece, fastening it with belt fasteners all around the patch. Cement all edges thoroughly. Where it is necessary to prevent seepage of fines through belt repairs, remove one ply of fabric from a belt remnant and place it under the fasteners and rip plates.

Vulcanized Patches

Vulcanized patches are superior to those described above, but require the addition of a portable vulcanizer (Fig. 14), rubberized fabric, tie gum, cover stock, a one-ply knife, and fabric pliers. In preparing a vulcanized patch, work down into the damaged belt as far as necessary by removing progressively smaller blocks of fabric with each successive play (Figs. 1-15). Then clean, roughen and cement the cavity; neatly fit in blocks of new fabric and finally apply the uncured cover. Skive the edges of the patch flush, and vulcanize. Such patches cannot be made successfully unless the belt is dry, because moisture will form internal steam blisters. For this reason, large users have drying racks in their maintenance shops. Only very large users of conveyor belting will find it economical to vulcanize their own belt patches and splices. The smaller operator may call on the manufacturer or his distributor for splicing and other such repairs.

Fig. 9 (right)—Finally, bottom cover is removed, completing removal of damaged area. Note that all lengthwise cuts have been made parallel to edges.

Fig. 6—Cut through first layer or ply of fabric.

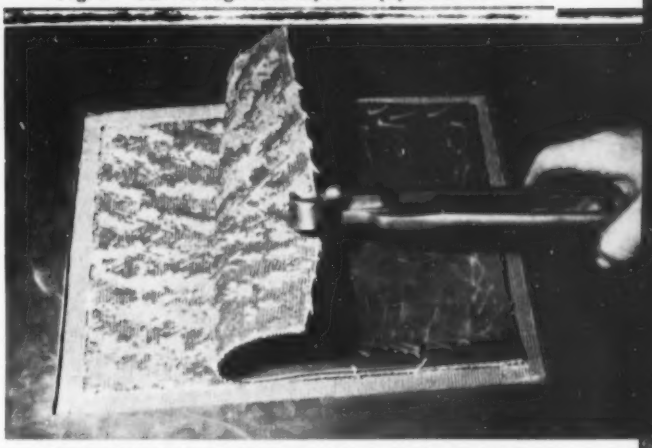


Fig. 7—Use belt pulling pliers to pull off first ply.

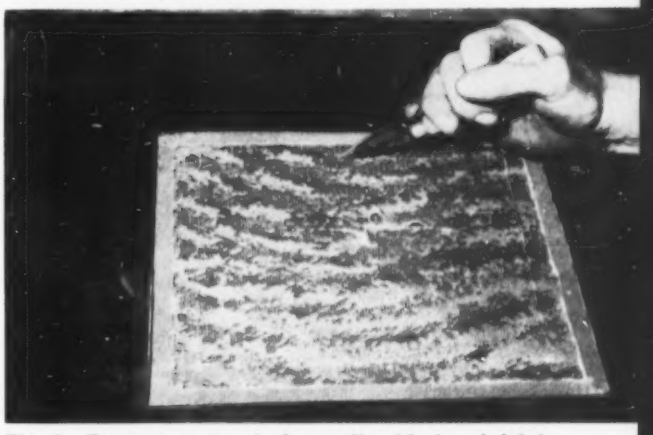


Fig. 8—Remove progressively smaller blocks of fabric.

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Fig. 10—Belt is turned over and the bottom cover is pulled off in a strip about 2-in. wide.

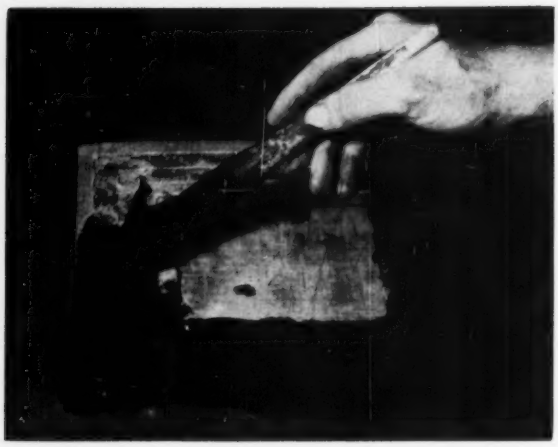

Fig. 11—Clean and roughen cavity, making certain fabric exposed is completely dry. Apply rubber cement.

Fig. 12—Cut squares of rubber impregnated fabric to fit each layer until cavity has been filled.

Fig. 13—Piece of uncured rubber similar to original cover is cemented in, rolled flush, then edges trimmed.

Fig. 14—Patched belt is placed in vulcanizer.

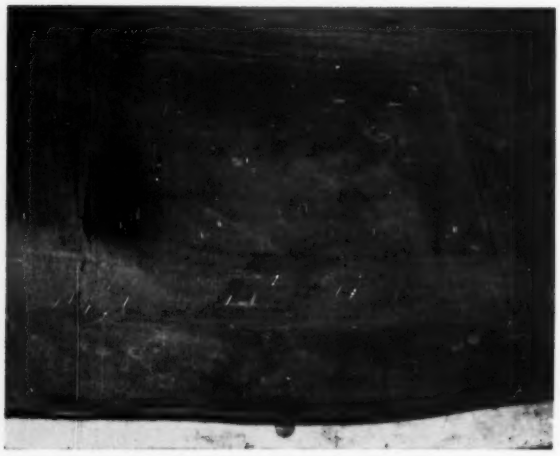

Fig. 15—The belt is ready to be returned to service.

General Contract Awarded As Fund Reaches $161,000

CONTRIBUTIONS to the AFS solicitation to raise the $250,000 needed to build the new Headquarters and Foundry Technical Center had reached $161,000 by November 5.

Announcement was also made that a general contract for the construction of the project had been awarded to Edwin E. Husak of Chicago, who will work to the plans and specifications of the firm of Giffels & Vallet, supervising architects and engineers. All construction is under the personal direction of F. C. Riecks, Ford Motor Co., Detroit, engineer in charge of plans for the AFS Housing Committee. Excavation was scheduled to begin on November 9.

New Contributors

Since the publication of new contributors in the November issue of AMERICAN FOUNDRYMAN, 42 new additions have been made to the list. They are shown below, in alphabetical order. Asterisks indicate that the firm or individual is making a contribution in addition to an original pledge.

***Aluminum Casting & Engineering, Milwaukee**
American Skein & Foundry Co., Racine, Wis.
Apex Steel Corp., Ltd., Los Angeles
Atlas Foundry & Machine Co., Tacoma, Wash.
Bronx Brass Foundry, Inc., New York
Bruckner, Walter A., Alloy Founders, Inc., Toledo, Ohio
Carman, Thornton S., Edwin S. Carman, Inc., Cleveland
***Central Michigan Chapter, AFS**
Christensen & Olsen Foundry Co., Chicago
Clow & Sons, James B.; Coshocton, Ohio
Duriron Co.; Dayton, Ohio
East Iron Works, Ltd., John; Saskatoon, Sask., Can.
Faunt, Chester K.; Christensen & Olsen Foundry Co., Chicago
***Goebig Mineral Supply Co., Chicago**
***Grindle Corp.; Markham, Ill.**
Hitchcock & Sons, Inc., R. C.; Minneapolis
Howe, C. O.; F. E. Schundler & Co.; Joliet, Ill.
Hughes Tool Co.; Houston, Texas
International Harvester Co., Chicago
Keokuk Electro-Metals Co.; Keokuk, Iowa
***Knight & Son, Inc., H. W.; Seneca Falls, N. Y.**
***Larson Foundry Co., W O.; Grafton, Ohio**
LeBaron Foundry Co., E. L.; Brockton, Mass.

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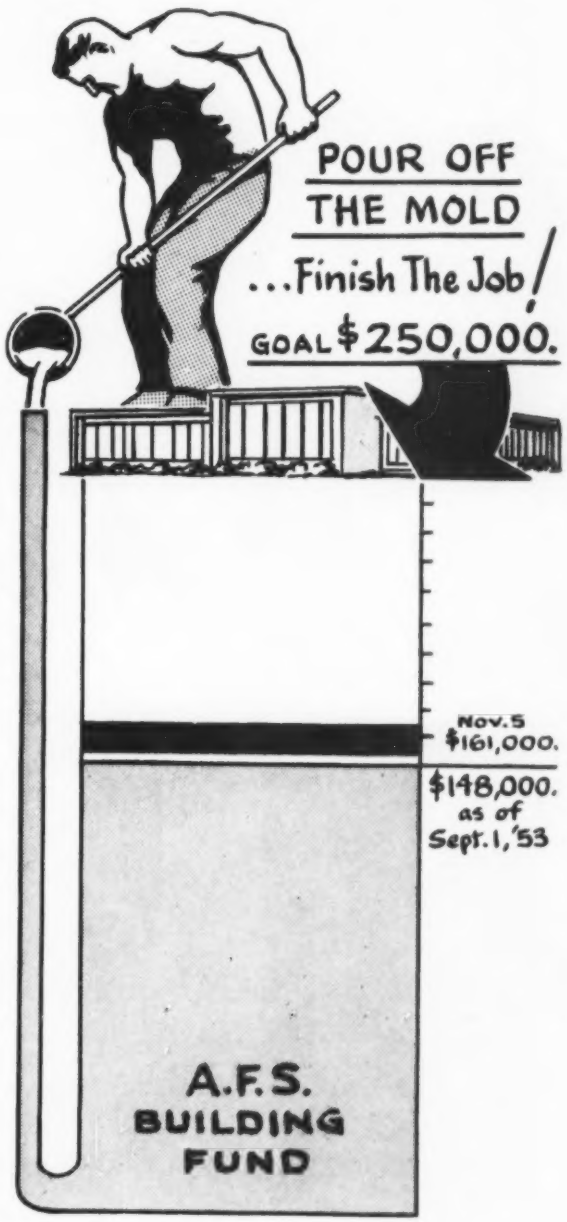

CASTING through the Ages

An improvised FOUNDRY, MANNED BY BRITISH INFANTRYMEN, AND USING AS FUEL, WASTE OIL DRAINED FROM ENGINE TANKS AND GEAR BOXES, WAS SET UP BEHIND FRENCH LINES DURING WORLD WAR I TO SALVAGE SCRAP METAL FOR REPAIRING DAMAGED WAR MACHINES.
IN 10TH CENTURY ENGLAND, BELL FOUNDING WAS PROBABLY STIMULATED BY AN ACT ENABLING A SAXON FRANKLIN OR CHURL OWNING 500 ACRES OF LAND TO ADVANCE TO THE RANK OF THANE IF HE HAD ON HIS ESTATE A CHURCH WITH A BELL TOWER.
Odd Bits. SO IMPORTANT WAS TIMBER TO THE CHARCOAL-BURNING FURNACES OF POST-REVOLUTIONARY DAYS, THAT FOUNDRY OWNERS, WISHING TO SELL, USUALLY LISTED IN THEIR ADS ONLY THEIR ACREAGE AND THE AMOUNT OF STANDING TIMBER AVAILABLE!
THE NINA, PINTA, AND SANTA MARIA EACH CARRIED SEVEN CAST IRON ANCHORS LARGER SHIPS OF THE TIME CARRIED AS MANY AS FIFTEEN! ANCHOR CABLES DETERIORATED AT SEA, AND ANCHORS WERE REGULARLY LOST.

AFS Conducts Safety Course, Receives Council Award

LAST year the AFS Safety Committee developed a training course for foundry supervisors covering the fundamentals of foundry safety. This course was designed primarily to get safety information to the men in the plant who were getting hurt, as a means of preventing these accidental injuries and/or fatalities.

In 1952 two of these courses were held in Chicago, and this year the first course was held in Pittsburgh, Pennsylvania. There were 32 members from 18 foundries attending. The Western Pennsylvania Safety Council, recognizing the value of such a supervisors' training course, cooperated with the AFS Safety Committee in conducting the course, making all arrangements for meeting rooms, and lunches, etc. The council co-sponsored this training course by contacting the foundries in the Pittsburgh area. This training course in safety is going to be used by the Western Pennsylvania Safety Council for other industries in that area on a similar basis.

A safety training course is another first for the AFS Safety Committee, and should aid in reducing the incidence of accidents in our industry. Others can follow this plan with profit. This is one phase of an educational program on safety which can be used by any Chapter to advantage.

Shown during a session of the AFS Safety Training Course, from left: A. D. Murphy, director safety suggestion plan, Crucible Steel Co. of America, Pittsburgh, Pa.; A. F. Gould, head, Department of Industrial Engineering, Lehigh University; W. N. Davis, director of safety, AFS; and H. B. Duffus, manager, safety and security, Westinghouse Electric Corporation, Pittsburgh, Pa. Course was held on September 30, 1953.

AFS Receives Safety Council Award

American Foundrymen's Society received a plaque from the National Safety Council during the Chicago convention of the latter organization. Awarded in commemoration of the AFS safety program, the plaque was received for the Society by Vice-President F. J. Dost (second from right). Presentation was made by E. C. McFadden, vice-president, Texas Employers Insurance Association and a vice-president of the Safety Council. Looking on are (left): W. W. Maloney, AFS Secretary-Treasurer; and W. N. Davis, Society director of safety.

Factors Influencing Riser Range And Feeding Adequacy—Part II

WILLIAM S. PELLINI / *Head, Metal Processing, Naval Research Laboratory*

W. S. Pellini

This article comprises the second part of the paper presented at the 1953 International Foundry Congress. It summarizes the results of a series of fundamental studies related to the solidification of castings and to riser action. Concluded with this installment, the first part of Mr. Pellini's paper appeared in the November, 1953, issue.

Plate and Bar Castings of Uniform Section. Plate and bar castings of a variety of systems, shown in Fig. 13 and 14, were cast in various thicknesses and lengths to determine the distances which could be made sound and the location and extent of shrinkage, when developed. The studies [13, 14, 15, 16] were made with induction melted steel of 0.25/0.30 per cent C, 0.50/0.80 per cent Mn, 0.35/0.50 per cent Si, deoxidized by the addition of 0.10 per cent aluminum to the ladle and poured at 2900 ± 25 F. In all cases risers were of sufficient size to eliminate under-riser shrinkage. The molds were made of synthetic silica sands of AFS No. 80 grain size, bonded with three per cent bentonite and containing three per cent water. Several series of castings of each thickness were made with 1-in. variations in length. The castings were sectioned to remove 1-in. thick longitudinal strips and radiographed at 1½ per cent sensitivity to determine the presence of shrinkage. It is evident that this represents a near ultimate test for solidity inasmuch as it reveals the presence of single voids as small as 0.015 inches and also of smaller voids if aligned to produce an equivalent effect.

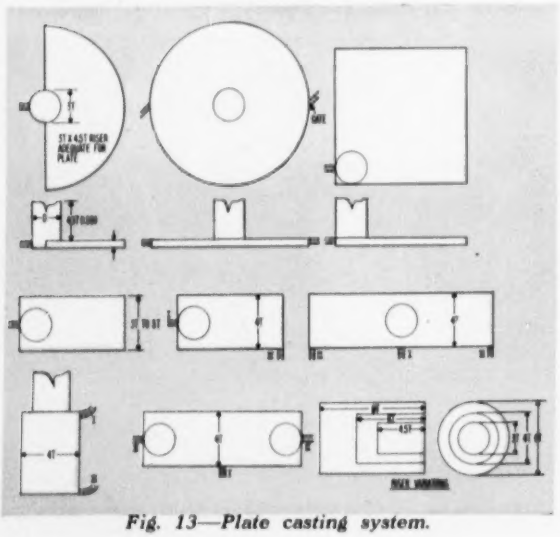

Fig. 13—Plate casting system.

The maximum distances which could be made completely sound are indicated by the formula and graphic relationships shown in Fig. 15 and 16. As the castings are made longer than the maximum distances, centerline shrinkage develops at the positions indicated. Castings with ends (single riser systems) always developed a sound end zone resulting from casting edge gradients; Fig. 17 presents a typical radiograph of such a casting. The length of this zone may be regarded as the contribution of the casting edge to the feeding distance while the difference between this distance and the maximum distance which may be fed to soundness may be regarded as the riser contribution. In cases where casting ends are absent (dual riser systems) the maximum feeding distance is simply the sum of the contributions of the two individual risers.

It was also established that the feeding distance provided by risers, as measured on the basis of the maximum length which can be made completely sound, is not maintained if the length is sufficient to develop centerline shrinkage. Under such conditions shrinkage, particularly in plates, often tended to extend to positions closer to the riser. The variable riser feeding distance contribution obtained under these conditions is indicated by the dashed areas in Fig. 15 and 16.

The use of a less conservative criteria of solidity to establish the feeding distances, such as four to five per cent sensitivity, indicates a marked increase in feeding distance to 8-10T as against 4½T for 2-in. thick sections; however, a barely significant increase is obtained for the case of thicker sections. This is understandable from consideration of the relative lateral distance of the solidification regions which contribute to centerline formation of thick and thin sections (Fig. 10). In the case of thin sections a relatively narrow "drain"

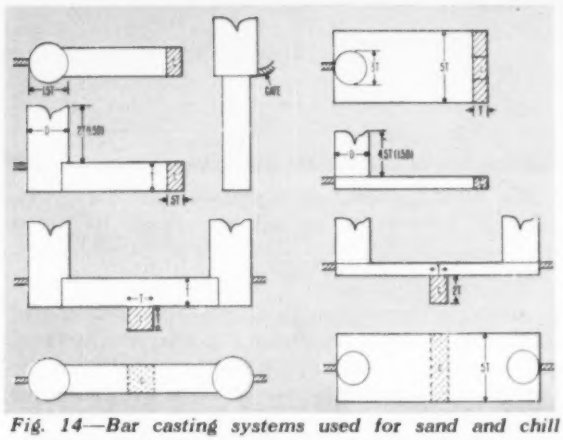

Fig. 14—Bar casting systems used for sand and chill studies and plate systems used for chill studies.

region is operative so that the small voids which result are barely measurable at 1½ per cent sensitivity. In the case of the thick sections, the relatively broad "drain" region results in the formation of relatively large voids observable at 4 to 5 per cent sensitivity, as the initial condition.

It is apparent that the feeding distances promoted by risers per se are dissappointingly short. Without directional solidification aids such as padding, casting edges, etc., risers cannot be expected to serve as efficient means of promoting feeding to soundness.

Position, Risering, and Gating Variables

Variations of casting position from horizontal to vertical, as shown in Fig. 13, were determined to have no effect on feeding relationships except in very heavy sections as typified by 8-in. bars. In the case of the 8-in. bar, an increase of approximately 4 inches in maximum feeding distance was noted for the vertical position (no difference for 6-in. bar). This effect was determined by thermal analysis studies to be related to the development of convection currents which produce a significant delay in the solidification of the riser and near-riser positions of the vertical casting, thus promoting more extensive directional solidification in slowly solidifying heavy sections. Accordingly, it is indicated that the popular practice of using extra-high risers to develop higher static pressures with the aim of increasing the feeding efficiency of the riser actually is ineffective. This conclusion is not surprising in view of the advanced solidification conditions which have been shown to exist in the casting and riser at the time such feeding must be effective. The increased feeding distance obtained in the case of heavy vertical castings represents a thermal rather than a ferrostatic pressure effect.

Increasing riser diameters greatly above the minimum required to eliminate under-riser shrinkage was found to have no effect on feeding distance for horizontal castings. Variations of riser size up to seven times the volume of a sufficient riser of minimum size were investigated. A small effect (approximately ½ to 1T increase in feeding distance) was observed for top risered vertical castings when risers twice the minimum adequate diameter were used. The increased feeding distance was ascribed to the riser overhang which created a hot pad area (see discussion of joined sections) at the riser-casting junction. The practice of using oversize risers to improve feeding distances must be considered ineffective in the light of these results.

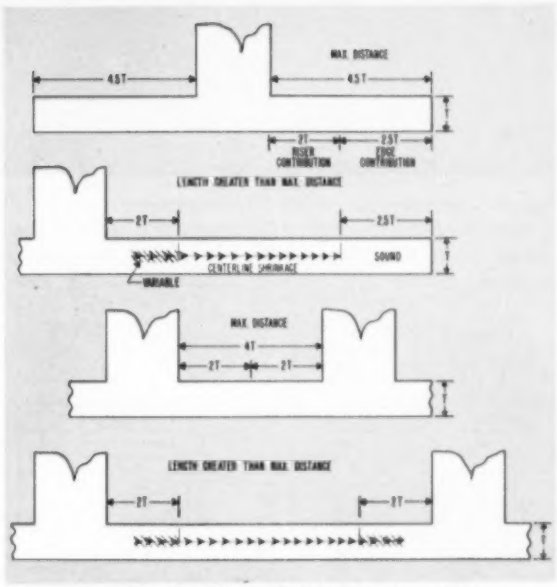

Fig. 15—Feeding relationships for plates.

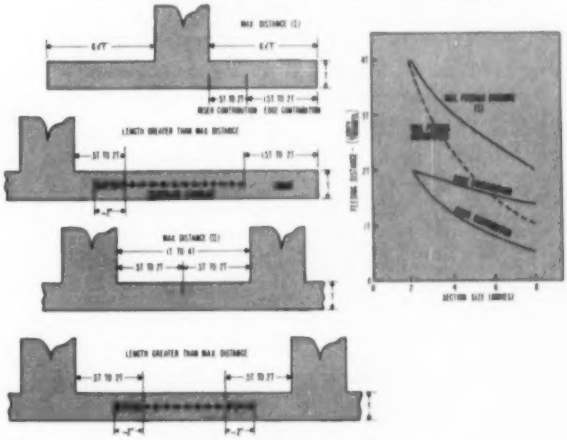

Fig. 16—Feeding relationships for bars.

Variations of gating procedures in which the gates were attached to the riser or conversely to casting ends (conditions I and II of Fig. 13) did not result in significant changes in feeding range.

Systematic studies of the behaviour of knock-off and blind risers have not been conducted to date. However, check evaluations indicated that knock-off and blind risers behave similarly to full or partial contact risers.

Gradient Conditions for Feeding to Soundness

The use of thermal analysis techniques permits an accurate determination of the thermal gradient conditions and therefore of the feed metal channels which are developed in various types of castings. Figures 18 and 19 illustrate the characteristics of the temperature distributions and thermal gradients for plates and bars of lengths less than and greater than the maxi-

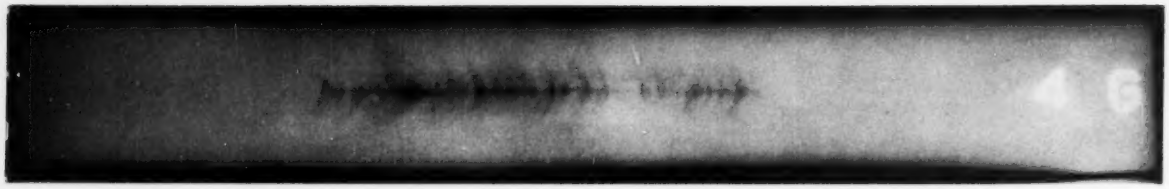

Fig. 17—Reproduction of photo of transverse radiograph of 1-in. thick longitudinal strip cut from a 4 x 4-in. bar casting of length greater than the maximum feeding distance. Visible are several regions including centerline shrinkage area, which separates the sound casting edge zone, shown on right side, from the sound riser zone, which is shown on left side of the photograph. Approximately 30 per cent reduction from original.

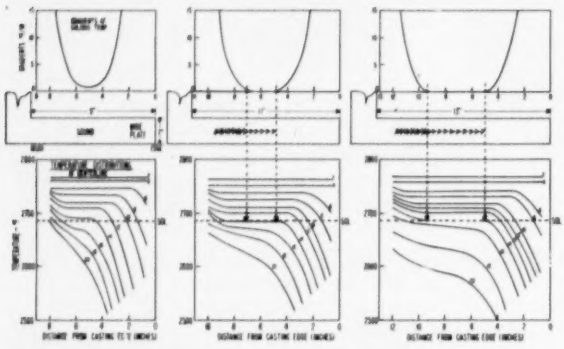

Fig. 18—Thermal conditions for the development of centerline shrinkage in plate castings.

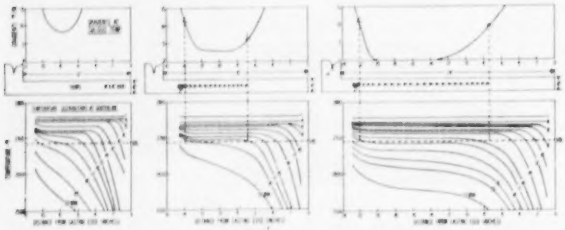

Fig. 19—Thermal conditions for the development of centerline shrinkage in bar castings.

mum distance which may be fed to soundness. The values of the thermal gradients which exist at the various longitudinal positions at the time that solidification is complete (solidus temperature is reached) are indicated by the upper graphs of the figures.

Figure 20 illustrates the general features of thermal gradient data and the method of interpretation of the data. The data are representative of bars or plates of lengths greater than the maximum distance which may be fed to soundness. In general, the temperature along the centerline falls to the liquidus in a short time (1-5 minutes for most cases to be considered)—the relative thickness and super-heat conditions determine the actual time required. During this time no measurable longitudinal gradients exist except at positions very close to the end surface and to the riser. As wall growth progresses, relatively steep gradients are established at the casting end in comparison to those developed at the riser end; the major portion of the casting centerline remains gradientless as indicated by the uniform temperature plateau. The riser and casting end gradient conditions gradually encroach on the plateau zone reducing its length as the temperature drops.

It is deduced that regions such as *A* to *B* develop tapered feed metal channels inasmuch as the extent of solidification at positions near *A* is always in advance that of positions near *B*. This is indicated from the fact that the thermal gradient curves at any given time denote lower temperatures, hence more advanced states of solidification, at *A* as compared to *B*. Directional solidification with consequent soundness should be expected in zone *A* to *B*. In a zone such as *B* to *C* the feed metal channels are indicated to be of a parallel wall type to the end of solidification. This is deduced from the fact that no longitudinal gradients exist between point *C* and *B* up to the time that this region drops below the solidus temperature. Feed metal flow should be possible through such a zone until the channel becomes highly constricted (near end of solidification at center). Since a position at *C* completes its solidification at the same time as a position at *B*, feeding should not be possible at near-ultimate stages and centerline shrinkage should be developed along the zone between *B* and *C*.

Decreasing Gradient Values

Zone *C* to *D* indicates a tapered channel similar to the one of zone *A* to *B* and therefore should be supplied with the feed metal required for soundness. The actual values of the gradients which exist at the time that the various positions become completely solid are observed to continually decrease in value. Accordingly, regions of the type which are shown as dashed areas to the right of *B* and to the left of *C* develop gradient conditions of such mildness (hence channel conditions of minor taper) that there may not be sufficient time for the entry and flow of feed metal during the end-point period of solidification for these regions.

The time effect may be appreciated by consideration of the rapidity of final freezing at positions of Fig. 4 equivalent to B-B_1 and C-C_1. The nature of solidification of the metal is an important factor in this respect for metals which have wide regions of mushy freezing require more feed metal at late stages of solidification than metals which develop narrow regions. Geometry factors are also important since the overall contour of the feed metal channels is determined by such factors. As the result of these factors centerline shrinkage may cover a distance of the order of B_1 to C_1 rather than *B* to *C*. In other words, shrinkage may be developed in regions of moderate thermal gradients (such as *B* to B_1) despite the indicated *directional* nature of solidification.

The effects of casting length on the nature of the thermal gradient and soundness conditions of 2-in. plates and 4 x 4-in. bars, Fig. 18 and 19, illustrate the general relationships for such shapes. Consideration

of the zones which develop soundness and shrinkage respectively indicate that gradients of approximately 1-2 F/in. are effective in promoting feeding to soundness in the case of plates. In the case of bars, much steeper gradients are required; shrinkage develops in regions which have gradients of less than 6-12 F/in. This indicates more difficult feeding for bar shapes.

An explanation for this is indicated schematically in Fig. 21. In the case of plates, longitudinal flow occurs along a wide channel with lateral feeding required in only two directions. In the case of bars, longitudinal flow must take place along a single rod-like channel with lateral feeding required in a full 360-degree sector; thus, a greater amount of feed metal is required and a smaller opening is provided. This suggests that shape factors are primarily responsible for the fact that the maximum feeding distance in bars ($6\sqrt{T}$) is less than that obtainable in plate shapes ($4\frac{1}{2}T$). For example, a 4-in. bar may be fed to soundness for a distance of 12 in. and a 4-in. plate to 18 in.

Use of Chills to Increase Feeding Distances

Investigations [7] of the effects of chills on solidification indicated that a steel bar completely surrounded by chills completes solidification in approximately one-fifth of the time required for one cast in sand; for plates the time is approximately one-tenth of that required in sand. Also, the nature of solidification was noted to be different in that narrow regions of mushy freezing are developed as compared to general mushy conditions typical for sand castings. Figure 22 illustrates these differences by solidification curves and related schematic diagrams of wall growth.

These investigations suggested that chills suitably placed at casting edges or between risers would act to increase the rate of solidification and accordingly to increase the effective feeding distance. Systems of the type shown in Fig. 14 were therefore investigated using suitable chill thicknesses. For the purpose intended, it was necessary to ensure that the chills were of sufficient thickness to develop a continuing rapid rate of heat extraction throughout the entire period of solidification. Thin chills which provide short time heat extraction effects obviously would not be suitable.

Figure 23 illustrates the thermal analysis method used to determine chill adequacy for plate castings. Chills of various thicknesses were placed at the ends of castings of a length somewhat greater than the maximum distance which may be fed to soundness when cast in sand. The thermal cycles at various interface-to-surface positions of the chills indicate the sufficiency of the chills for continued rapid heat extraction during the known time (50 minutes) of solidification of the castings.

The thermal cycles show that chills equal to the thickness of the plate (1T) maintain a near constant interface temperature during intermediate and late solidification times indicating the absorption of heat at the same rate as released by the casting; $\frac{1}{2}$T chills show a continuing temperature rise at the interface until relatively late times indicating approach to heat saturation; 2T chills show a decreasing temperature at interface positions after a relatively short time indicating a thickness greater than sufficient to maintain a heat balance with the casting. Accordingly, it was concluded that 1T chills are of sufficient thickness for plate castings. Chills of $\frac{1}{2}$T thickness were found to be sufficient for the faster solidifying bar castings. Radiographic evaluation indicated equivalent effects for the sufficient and oversufficient chills and a lesser effect for the insufficient chill, thus corroborating the thermal indications.

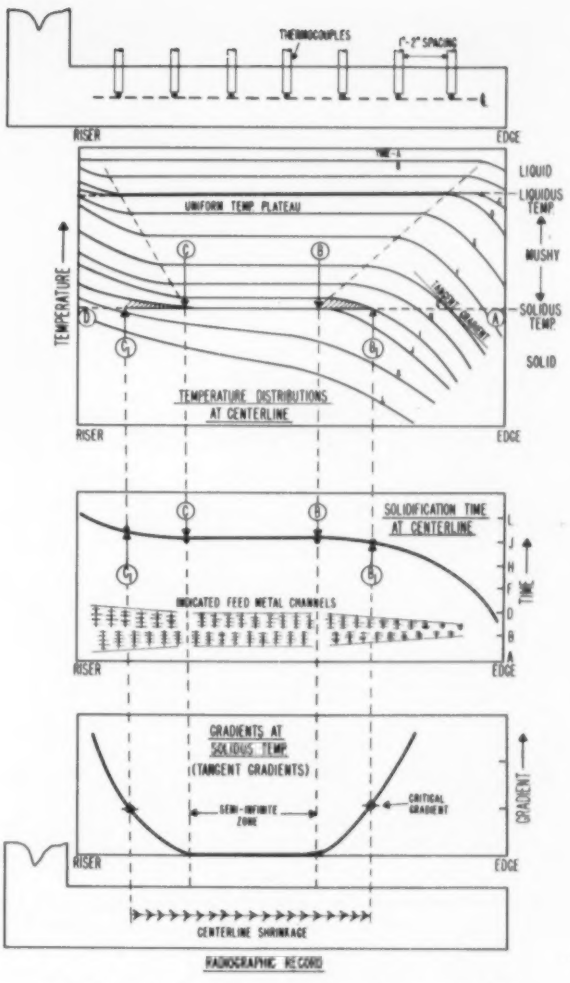

Fig. 20—Interpretation of thermal analysis data.

Chill Influence Varies

The effects of chills on the maximum distance which can be fed to soundness for different systems are summarized in Fig. 24. It is observed that the increase in feeding distance (2 in. for plates, 1T for bars) obtained by using chills at casting edges is disappointingly small; however, the effect when located between risers (casting edges absent) is very large. For example, while a 3-in. plate section located between two risers may be fed for a maximum distance of 12 inches (6 inches per riser) the addition of a sufficient chill midway between the risers permits a spacing of 30 inches (15 inches per riser); similarly risers on a 3 x 3-in. bar may be separated by only 10 inches (5 inches per riser) while the addition of a chill permits a spacing of 24 inches (12 inches per riser). It is fortunate that a marked increase in feeding distance is obtained by the

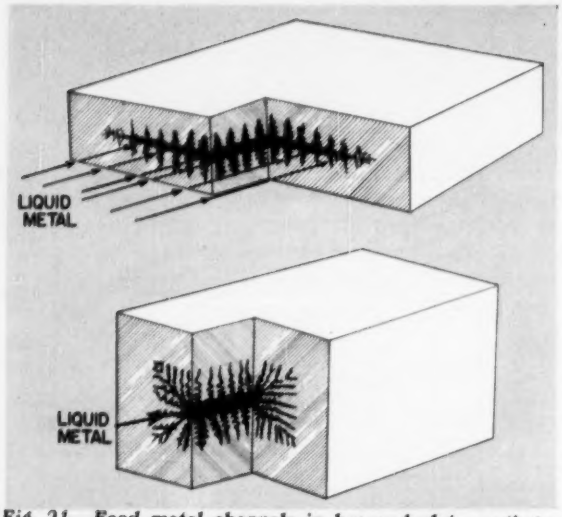

Fig. 21—Feed metal channels in bar and plate castings.

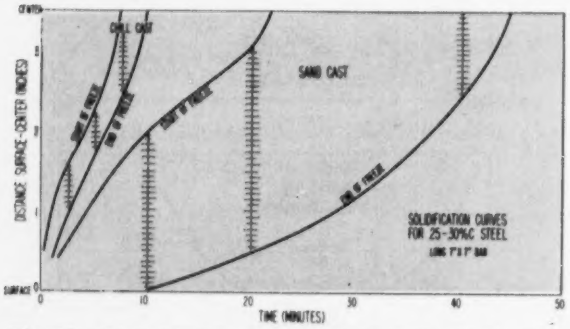

Fig. 22—Comparison of chill and sand wall solidification.

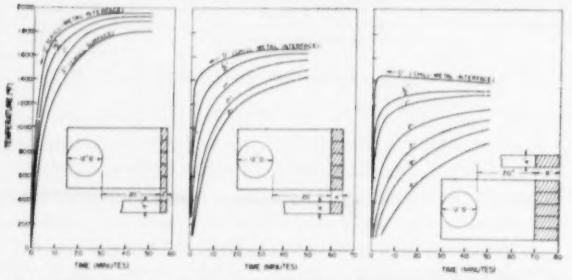

Fig. 23—Cycles showing relative thermal adequacy of chills.

use of chills for the case of multiple risers which normally present the most difficult problem. The more extensive feeding distances which may be obtained by this simple use of chills should result in a net increase in casting yield inasmuch as fewer risers are required to provide the necessary coverage.

The primary effect of adding the chill to the casting end entailed the creation of a longer sound end zone. In cases where bars or plates were of sufficient length to develop shrinkage it was observed that the length of the sound end zone was greater than that obtained in sand by the exact amount that the maximum feeding distance was increased by the use of the chill. Figure 25 presents thermal data for plates and bar castings illustrating a shift in the critical 6-12 F casting edge gradient zone for bars by 1T and a shift of the 1-2 F casting edge gradient zone for plates by approximately 2 inches. This observation corroborates the radiographic findings that the increased feeding distances results entirely from an increase of the casting end effects.

Thermal studies indicated also that chill casting edge effects are primarily attributable to the faster solidification developed during the period of *wall growth* from the casting end. For example, Fig. 26 illustrates that the relative difference in the distance of penetration of the "end of freeze" point along the centerline is established at relatively early times. An approximately five-fold faster rate of solidification develops from the chill end face as compared to the sand end face. As the result the "end of freeze" wave representing *wall growth from the end face* reaches a point of common junction with the lateral "end of freeze" wave from the side walls at a greater distance from the end than in the case of the sand end-face. This is indicated in Fig. 26 by the apex of the triangular area, which marks the position at which directional solidification by end-face wall growth along the centerline terminates and directional solidification solely by *lateral* wall growth begins.

The inability of chills to promote greater distances of directional solidification is ascribed to the tendencies of chills to undercool the adjacent solid metal in preference to extracting heat from deeper positions in the casting. The end zone temperatures which exist at the time centerline shrinkage begins to form in the casting show this effect clearly (Fig. 26). In the case of sand the end face is cooled to 2100 F while in the case of the chill the end face is cooled to 1500 F. Similarly a position 2 in. from the end face is cooled to 2300 F and 2100 F respectively. Because of this effect the use of high conductivity chills (copper blocks and water cooled shells) as well as over-thick steel chills does not add significantly to the small effect obtainable with sufficient chills. Such chills develop still lower interface temperatures which result only in greater undercooling of the already solid end face metal. In summary, it may be stated that chills do not develop long-range thermal effects but promote intensive short-range cooling effects.

Short-Range Action

The thermal effects of chills located between risers (Fig. 27) is very great since this represents the utilization of short range action resulting in rapid solidification at the point of application. For a 3-in. plate, 3½ minutes is required for solidification through the thickness as compared to a normal 36 minutes; thereafter the solidified region acts as a chilled casting edge. The midspan region which normally behaves in temperature plateau fashion (gradientless) is thus changed to a synthetic casting edge which is equivalent to splitting of the casting into two separate parts and chilling the split ends.

The empirical feeding distance data and the generalized concepts of solidification and geometry factors may be recognized as having both immediate practical value and long range fundamental value. From the practical viewpoint, the data are useful in handling uniform sections which present difficult feeding problems. From a fundamental viewpoint, the data provide

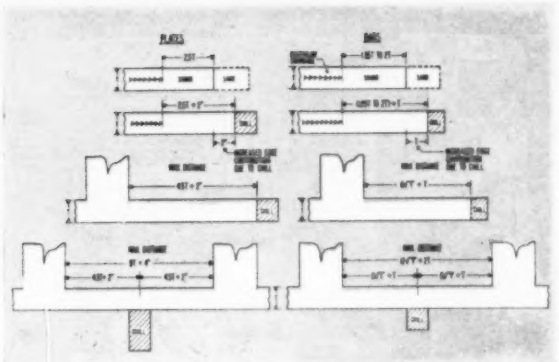

Fig. 24—Effect of chills in increasing feeding distances.

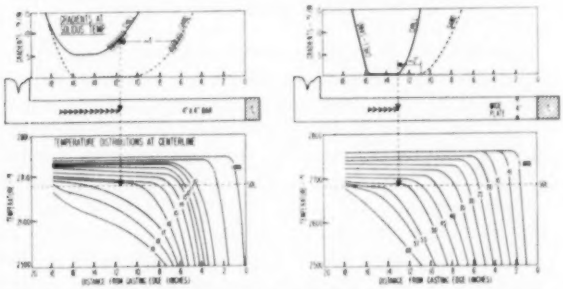

Fig. 25—Shift of the critical gradient zones of bar and plate castings due to chills.

a base line for analytical study. Similar systematic study of the feeding and related thermal characteristics of joined sections was undertaken to provide information required for more complex, non-uniform castings.

The first step entailed a study of plate castings joined in series of decreasing thicknesses. The relationships evolved from studies of uniform sections suggested that heavy sections should promote feeding in adjoining thinner sections and that the thinner sections should decrease the effects of thick section casting edges. Also, it was suggested that if the small sections are very thin compared to the thick sections, the converse would be true; i.e., the thin sections may act as heat radiators and thus serve as mild chills. However, this effect should not be pronounced since the thin section only could approach the effect of a chill (2-in. added feeding distance).

The casting systems shown in Fig. 28 were studied in various combinations with thicknesses of 1, 2, 3 and 4 inches. Figure 29 presents the maximum distances which can be fed to complete soundness for the various combinations and the indicated empirical formula relationships.

It is deduced that the maximum feeding distance of the smaller or "parasite" plates of a given thickness increases as the thickness of the larger or parent plate is increased. Further, the feeding distance in all parasite plates, regardless of thickness, is essentially the same when joined to a parent plate of a given thickness. The maximum feeding distances in parasite plates are as great as, or exceed, those obtained when the plates are cast separately. The improvement for the 4-to-1 thickness combination amounts to approximately 200 per cent ($4\frac{1}{2}$ in. to 14 in).

As the thickness ratio is decreased, by increasing

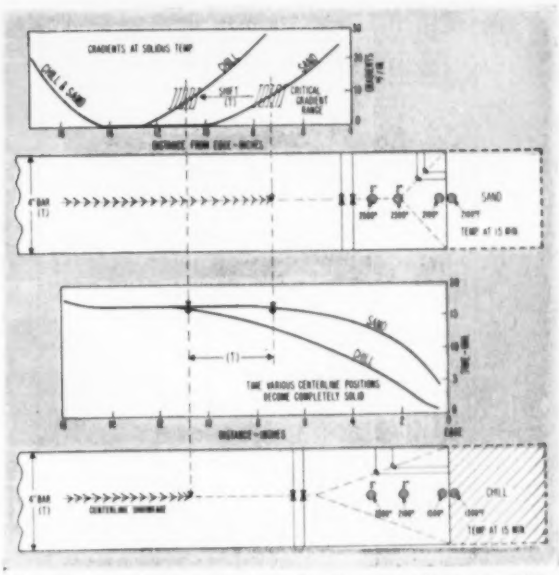

Fig. 26—Illustrating short-range thermal effect of chills.

the thickness of the parasite plate, the improvement in feeding distance decreases until for the 4-to-3-in. combination the maximum feeding distance of the 3-in. plate is essentially the same as that obtained in a separately cast plate ($4\frac{1}{2}$T). As the parasite plate approaches the thickness of the parent plate its feeding distance falls below $4\frac{1}{2}$T inasmuch as the combined feeding distances of parent and parasite plates necessarily approach the $4\frac{1}{2}$T value of a plate of uniform thickness.

Parent and Parasite Effects

The increase in feeding distance of the thinner sections is countered, in part, by a decrease in the feeding distances of the thicker or "parent" plates. The feeding distances in intermediate plates, which act both as parent and parasite, are governed by the resultant effects of the parent plate which tends to increase the distance and of the parasite plate which tends to reduce it. As a result, the feeding distances of intermediate plates fall between the values obtained when the plate serves as strictly a parent or a parasite type.

When parent plates exceed the thickness of parasite plates by a ratio of 1.4 or greater, the parent plate is more effective in promoting feeding in the parasite plate than a conventional round riser. This is ascribed to the more pronounced thermal effects produced in the parasite plate by the re-entrant angle which covers the entire plate width. With risers the re-entrant angle is limited to a smaller contact area which moreover is of lesser heat intensity due to lateral heat loss into the surrounding cold sand. Figure 30 illustrates the thermal conditions which have been described. Figure 31 which presents the gradients developed in a separately cast 1-in. thick plate and the same plate joined to a 3-in. thick plate illustrates the respective thermal effects of the riser and of the parent plate. It is observed that relatively steep gradients are developed in the region which is essentially gradientless for the separately cast plate and that the solidification time at a position one inch from the riser or parent plate is

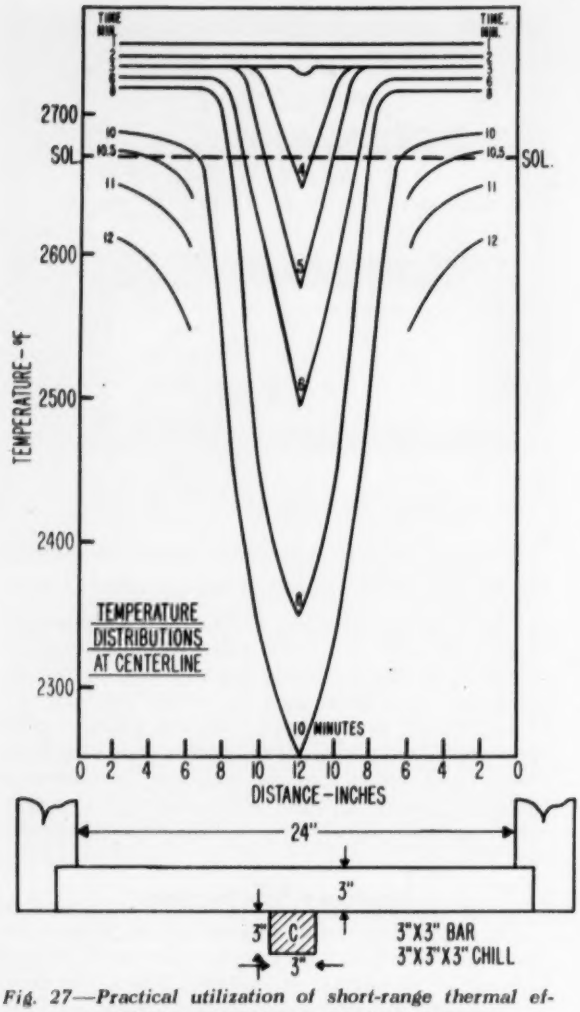

Fig. 27—Practical utilization of short-range thermal effects of chills for large increase in feed distances.

increased from approximately 3½ minutes for the riser system to seven minutes for the joined plate system.

Such pronounced thermal effects are required to produce the marked increase in feeding distances which are observed; in fact the thermal effects developed at the junction area are essentially equal to those produced by the use of metal taper. This is demonstrated by comparison of the feeding distances of parasite plates joined to parent plates with the feeding distances obtained by Brinson and Duma[17] using metal taper (Fig. 32). The comparisons indicate that metal taper is more efficient than thermal taper only for the most extreme conditions.

Effect of Thin Sections

The mild chill effect predicted for very thin parasite plates is demonstrated in Fig. 33. A ⅛-in. parasite plate joined to a 3-in. parent plate promotes an increased feeding distance of approximately one inch in the parent plate. This indicates that thin sections have relatively insignificant thermal or feeding distance effects on heavy sections. From a practical viewpoint of riser positioning or dimensioning the intereffects of

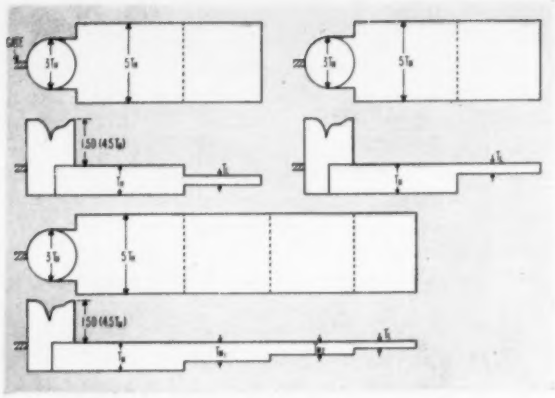

Fig. 28—Joined plate casting systems.

sections of great thickness difference may be neglected. Thus, V/SA calculations need not account for the presence of thin members of complex castings.

It is apparent from the extensive feeding distances which may be obtained by joining plates in a series of decreasing thickness and from the effects of thermal tapers produced by metal or hot sand padding, that the solidification characteristics of the casting determine the distances which risers feed to soundness. The feeding distance which is promoted directly as the result of riser thermal effects are comparatively minor. The term *feeding range of risers* should be recognized, therefore, as having little significance unless qualified to specific casting systems. Thus, risers must be considered primarily as reservoirs of liquid metal having great potential feeding capacity which may or may not be made use of depending upon the solidification characteristics of the casting.

The basic concepts of solidification relationships to feeding may be applied to the case of complex, "problem" castings by thermal analysis of critical locations of such castings. The necessary thermal data are readily obtained by the insertion of a small number of thermocouples at the critical areas. This procedure should permit considerable savings of time and money in contrast to the process of repeated pouring of castings with haphazard variations of risering and gating details arrived at intuitively.

Extending Feeding Concepts to Other Metals

The development of the relationships between feeding and solidification characteristics permits a qualitative analysis of the behavior of metals other than the 0.20–0.30 per cent carbon steels. Exploratory investigations of various other metals have shown that the differences in feeding characteristics are predictable from consideration of the mode of solidification. In this respect the solidification diagram depicting the nature of the progression of "start" and "end of freeze" waves provides the basic information required.

Figure 34 presents wall growth solidification curves of various metals representative of possible deviations from the solidification characteristics of 0.25–0.30 per cent carbon steel. The low carbon steel represents a metal characterized by highly progressive wall growth, i.e., by narrow mushy regions and early growth of a completely solid skin. The bronze alloy represents the

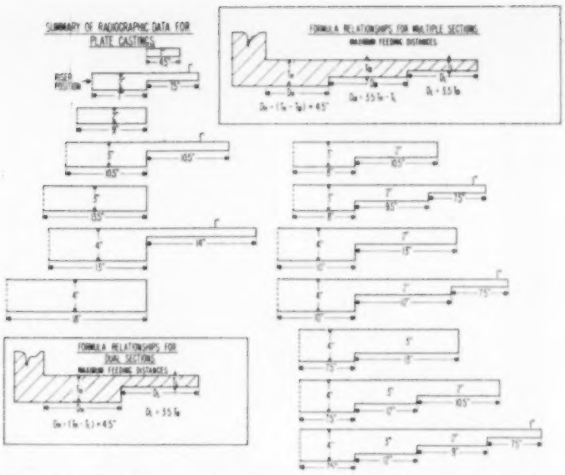
SUMMARY OF RADIOGRAPHIC DATA FOR PLATE CASTINGS
FORMULA RELATIONSHIPS FOR MULTIPLE SECTIONS
FORMULA RELATIONSHIPS FOR DUAL SECTIONS

Fig. 29—Feeding relationships for joined plate castings.

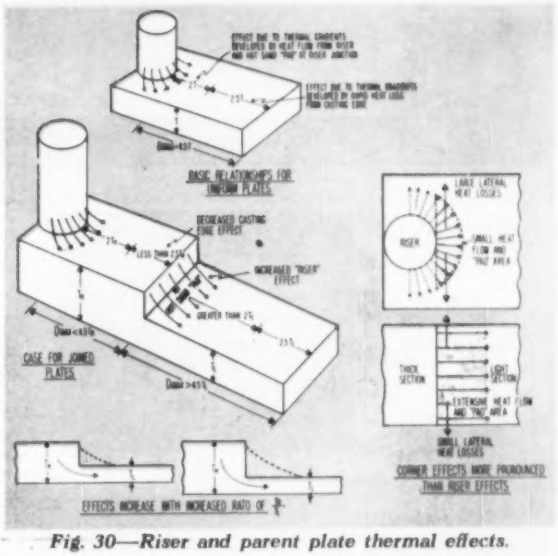

Fig. 30—Riser and parent plate thermal effects.

opposite case of a metal characterized by slightly progressive wall growth, i.e., by development of a general mushy condition throughout the casting and with very late growth of a completely solid skin. The hypoeutectic gray iron represents two-step solidification entailing initial development of a general mushy condition and final solidification by highly progressive eutectic formation featuring the anomalous characteristic of expansion during the liquid-solid reaction rather than the shrinkage shown by most metals[8, 18].

The highly progressive solidification features of the low carbon steel are due primarily to the narrow temperature range of solidification, inasmuch as the thermal constants of the two steels are essentially the same. The feed metal channels developed as the result of this mode of freezing are relatively free as compared to the 0.30 per cent carbon steel (Fig. 35). Accordingly, flow of feed metal is much easier, particularly at late stages of solidification. Steels of this type feed to longer distances than the 0.30 per cent carbon steels prior to developing centerline shrinkage. For example, the feeding distance of 2-in. plates was increased approximately 30 per cent. This suggests that gradients of lower value than required for the 0.30 per cent carbon steel provide effective feeding for metals which solidify in a highly progressive fashion.

Mushy Freezing

The exaggerated mushy freezing of the bronze results primarily from the very high conductivity of the metal which effectively restricts the thermal gradients established during solidification to very low values. This feature coupled with the very wide temperature range of solidification dictates that the condition of solidification at the surface is never greatly in advance of that at the center. Such a metal becomes completely mushy from surface to center for a period which may be as long as 90 per cent of the total solidification time. Gas pressure bleeding tests of the type shown in Fig. 3 have corroborated the thermal analysis indications. Solidification during this period proceeds by gradual thickening of the solid dendrites until very little liquid remains. When the final freezing wave leaves the surface there is very little liquid remaining to solidify with the result that the "end of freeze" wave proceeds at high rates (approximately two inches per minute indicated by Fig. 34).

The advanced state of solidification prevents effective flow of feed liquid at the high rates demanded by the rapidity of movement of the "end of freeze" wave, and accordingly lateral shrinkage channels are developed throughout the casting. This feature accounts in part for the lack of pressure tightness which characterizes these alloys. The fact that centerline shrinkage is not developed in bronzes of this type may be ascribed to the development of lateral shrinkage cavities which in effect prevents the concentration of shrinkage to the centerline. Gross shrinkage cavities are readily formed in bronzes of this type. However, the development of the shrinkage cavity is usually accompanied by a puncture to the surface since a completely solid skin is not developed until almost the end of solidification. If a puncture does not result, there is a tendency to develop "dishing" over the shrinkage area due to the atmospheric pressure over the weak semi-solid skin.

Feeding range studies based on pressure tightness evaluations have shown[19] that gradients having a minimum value of 25 F/in. are required for feeding to soundness. Such gradients may be obtained on uniform sections only by use of tapered chills placed parallel (short range use) to the path of directional solidification. End face chills such as described previously (long range use) are ineffective, thus confirming that the concepts of proper chill utilization (short range action) described for steel are fully applicable to other metals.

Two-Stage Solidification

The most significant aspect of the complex solidification mechanism of hypoeutectic gray iron is the two-stage solidification cycle. The first stage, dendrite formation, is similar to that of steel in that it requires feed metal to compensate for liquid-solid shrinkage. The second stage, the eutectic reaction, does not require feed metal inasmuch as formation of the low density graphite phase results in a net volume increase.

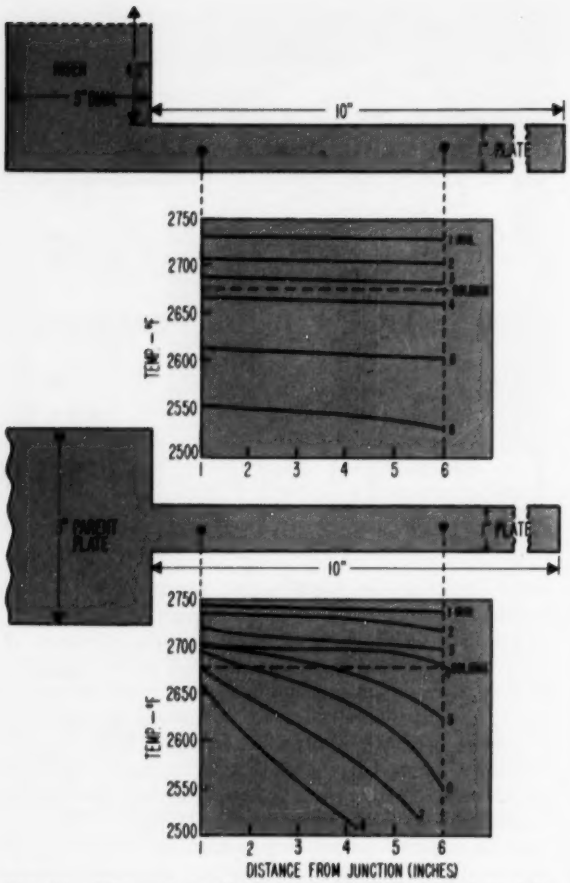

Fig. 31—Thermal gradient conditions developed in 1-in. plate from conventional riser and 3-in. parent plate.

Th two cycles do not follow in immediate sequence—to the contrary the first cycle essentially goes to completion throughout the entire casting before an appreciable progression of the second cycle is developed.

Unlike the case of steel for which feed metal flow is always counter to the path of directional solidification, the flow of feed metal in the case of iron is reversed during the eutectic period, resulting in purging through the riser if open, or in an expansion of the casting if the riser is solidified. Thus, while at intermediate and late stages of solidification steel castings tend to drain heavy sections to satisfy the feed metal requirements of the lighter sections, gray iron castings actually pump liquid back from the light to the heavy sections. The sufficiency of small bobs for feeding of rangy sections of gray iron is explained by this freezing process inasmuch as a positive flow of feed metal from a feed source is only required during the early stage of freezing. In fact, feeding need not be complete during this period since a feeding deficiency will permit room for subsequent relief of the eutectic reaction expansion.

It is also apparent that centerline shrinkage should not be possible with this mode of freezing. The feeding range of gray iron sections of uniform thickness with respect to centerline shrinkage is therefore essentially unlimited. Gross shrinkage in gray iron castings may occur as the result of a gross feeding deficiency for the case of chunky castings, particularly for hypoeutectic types of low carbon equivalent. Adequate risering is needed as in the case of steel to counter this deficiency.

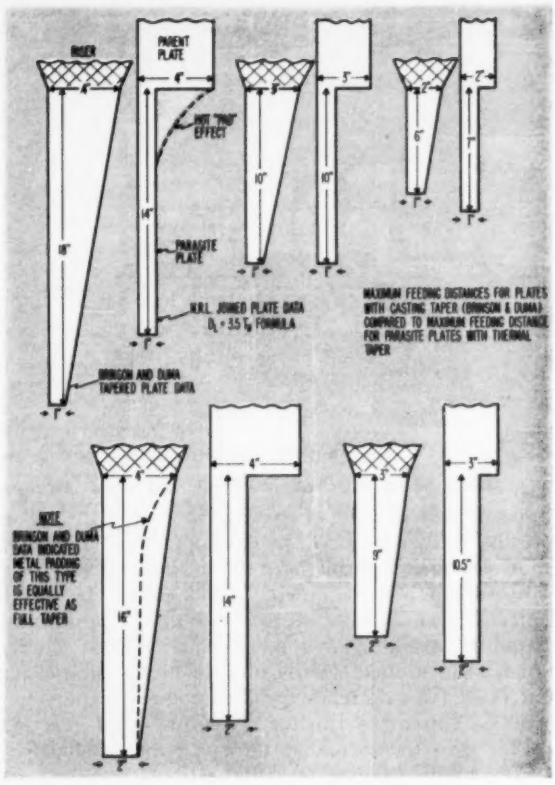
RISER
PARENT PLATE
HOT "SPOT" EFFECT
PARASITE PLATE
BRINSON AND DUMA TAPERED PLATE DATA
MAXIMUM FEEDING DISTANCES FOR PLATES WITH CASTING TAPER (BRINSON & DUMA) COMPARED TO MAXIMUM FEEDING DISTANCE FOR PARASITE PLATES WITH THERMAL TAPER
NOTE
BRINSON AND DUMA DATA INDICATED METAL PADDING OF THIS TYPE IS EQUALLY EFFECTIVE AS FULL TAPER

Fig. 32—Comparison of effect of metal and thermal taper.

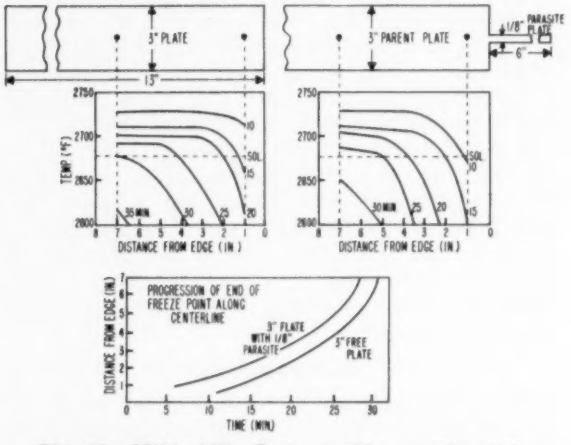

Fig. 33—Mild chill effects of thin parasite plates.

Acknowledgments

This report is a summary of the comprehensive studies conducted by H. F. Bishop, E. T. Myskowski, F. A. Brandt, R. P. Dunphy and W. H. Johnson of this Laboratory. It should be recorded that their supervision of the research, and their analysis and interpretation of the data provided the basis for this contribution to foundry technology. The administrative support and active technical interest of Dr. O. T.

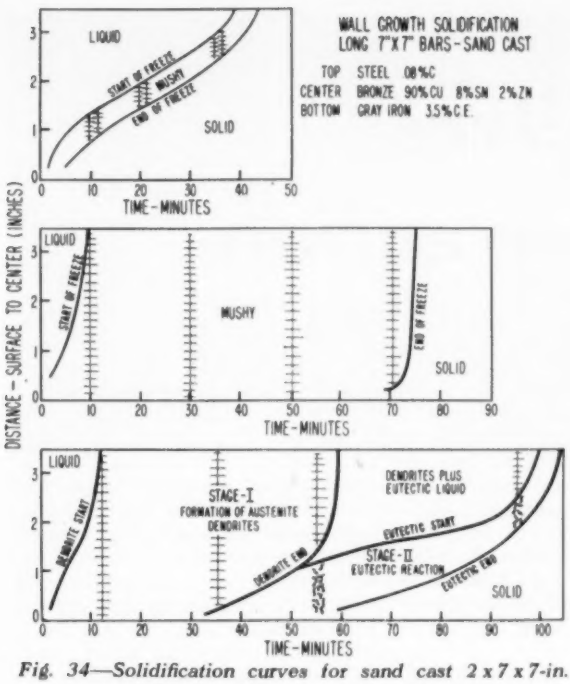

Fig. 34—Solidification curves for sand cast 2 x 7 x 7-in. bars of various types of metals.

Marzke, superintendent of the Metallurgy Div., made possible and encouraged these studies. The preparation of the illustrations represents a valuable contribution by E. E. Layne, also of the foundry research staff.

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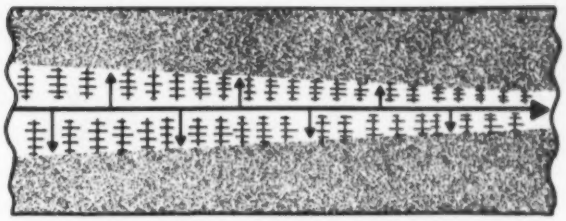
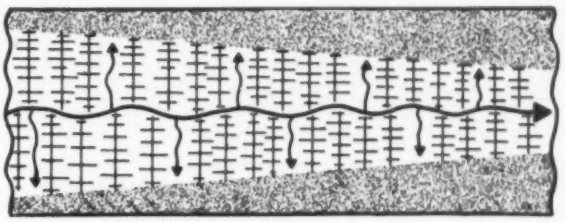


STRONGLY PROGRESSIVE SOLIDIFICATION RESULTS IN FREE CHANNELS CONDUCIVE TO EASY FEEDING



SLIGHTLY PROGRESSIVE SOLIDIFICATION RESULTS IN HINDERED CHANNELS FEEDING IS DIFFICULT

Fig. 35

Report on Vertical Gating

"Study of Vertical Gating," progress report on the fluid flow research conducted by AFS, is available as a separate publication as well as in the 1953 issue of AFS TRANSACTIONS. While previous research in this continuing project was directed toward solving gating problems for castings of relatively large horizontal area to thickness ratio, the latest work was initiated to study vertical gating, particularly as it applies to permanent molds and shell molds.

Essential findings at this stage are that sprues with rectangular cross-sections which enter the bottom of the casting seem to be preferable for vertical gating of simple plates made in small molds. For heavier plates made in large molds, a tapered sprue offers some advantages. In general, the use of a tapered sprue appears to permit the use of higher flow rates with a minimum of turbulence, and it is believed that when tests are made the use of a tapered sprue will be universally beneficial.

"Study of Vertical Gating" can be obtained from American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill. Price is 50¢ for members, 75¢ for non-members.

G.I.F.S. Holds Silver Anniversary Convention

SILVER anniversary of the Gray Iron Founders' Society was celebrated October 8 and 9 at the Hotel Jefferson, St. Louis, with a series of business sessions, election of officers, presentation of awards and recognition of past presidents, and committee meetings.

G.I.F.S. President Henry J. Trenkamp, Ohio Foundry Co., Cleveland, who presided throughout the anniversary meeting, was re-elected. Other officers elected are: C. R. Ker, Dalton Foundries, Inc., Warsaw, Ind., vice-president; E. G. Huffschmidt, Western Foundry Co., Portland, Ore., secretary; W. O. Larson, W. O. Larson Foundry Co., Grafton, Ohio, re-elected treasurer; and Donald H. Workman, re-elected executive vice-president.

The keynote address by Peter E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, Ohio, highlighted the morning of the first day, which included presentation of reports by officers, and reports on technical activities and safety, hygiene, and air pollution. Mr. Rentschler paid tribute to the foundrymen who organized the Gray Iron Founders' Society in 1928 and at considerable sacrifice kept it going through the difficult years of the 1930's.

Organized 1928

Mr. Rentschler told how 54 foundrymen representing 27 foundry centers met in Pittsburgh in 1928 to organize the Gray Iron Institute. Object was to promote product improvement and greater usage of gray iron which was at that time being replaced by other materials. Officers were elected at the second meeting in Cleveland, April 10, 1928, and those named were: Walter L. Seelbach, Superior Foundry, Inc., Cleveland, president 1928-30 (and 1943-45); the late B. H. Johnson, Cresson-Morris Co., Philadelphia, first vice-president; A. E. Hageboeck, Frank Foundries, Moline, Ill., second vice-president; Henry Chafee, Builders Iron Foundry Co., Providence, R. I., treasurer; and the late Arthur J. Tuscany, executive secretary.

Among the aims of the new organization were the improvement in quality and increase in utility of gray iron, the study of hand-to-mouth buying, the study of facilities in existence to determine if there was over-capacity, the examination of new methods of merchandising, the development of new markets, the study of possible liquidation and consolidation of facilities, and the study of advertising and other publicity media.

During N.R.A. days, the society developed a code of fair competition for gray iron foundries, Mr. Rentschler pointed out. In the period following the end of N.R.A., it was the personal sacrifices of the late Col. William Watts Rose (G.I.F.S. executive vice-president 1936-46) and the extra contributions of time and money expended by some members of the society that got the group through the lean years, he said.

The society performed a great service to government and industry during World War II through the opening of a branch office in Washington, D. C., it was indicated.

The keynote address was preceded by reports from President Trenkamp, Treasurer Larson, Executive Vice-President Workman, Technical Director C. O. Burgess, and Wm. N. Davis, AFS staff member who directs the foundry industry's Safety & Hygiene & Air Pollution Program.

Mr. Trenkamp commended officers and committee members for their service during the past year and cited those who had served in the various government agencies during the conflict. He paid tribute particularly to John M. Price for his O.P.S. work.

The country must protect itself by not relaxing scrap export restrictions, Mr. Workman said in his report. The Redesign Contest, which plays up development of markets and recapturing of markets, is one of the best forms of promotion for gray iron castings, he stated. He urged all gray iron foundrymen to search their files for examples of redesign of products to be made more advantageously in gray iron.

Mr. Burgess described a visit to the British Cast Iron Research Association which, he said, is performing services to its members of a type that could be performed in the United States. An arrangement has been developed, he reported, for an exchange of information between B.C.I.R.A. and G.I.F.S.

Mr. Davis told how the Safety & Hygiene & Air Pollution Program had been developed under the auspices of AFS at the request of the National Castings Council. He outlined the work of the steering committee and the five working committees and cited the importance of bringing recommended practices manuals, which in the past have formed the basis for setting up codes in most states, up to date. He invited foundrymen to direct inquiries regarding safety, hygiene, and air pollution to the AFS office.

News From Washington

Luncheon speaker the first day was Under Secretary of Commerce Walter Williams. Mr. Williams described the newly-created Business and Defense Services Administration set up to combine a number of previous services and provide, among others, a central point of contact for business in government. Key people from industry are being invited to head the industry divisions on a six-months rotating basis, he said. He assured gray iron foundrymen of representation in the iron and steel division of the B.D.S.A. and expressed hope that gray iron founders would respond when requested to contribute the services of a man to serve in the division.

Regarding economic stability and growth, Under Secretary Williams said he believes the administration will establish a good climate for operation of business so businessmen can take care of their own operational details without help or interference from government. There is no room for pessimism about business conditions over the long pull, he declared.

"Management Techniques," was the subject of a panel of speakers in the afternoon session. Panel chairman was

Officers and directors of the Gray Iron Founders' Society for 1953-54. Seated left to right are: C. H. Meminger, Posey Iron Works; R. T. Lewis, Keen Foundry Co.; C. H. Ker, Dalton Foundries, Inc., vice-president; Henry J. Trenkamp, Ohio Foundry Co., president; Walter O. Larson, W. O. Larson Foundry Co., treasurer; H. L. Edinger, Barnett Foundry & Machine Co. Standing left to right are: J. W. Simmons, Jr., Cox Foundry & Machine Co.; G. L. Nimocks, Dayton Foundry; Donald H. Workman, executive vice-president; J. A. Cochran, Crawfordsville Foundry Co.; E .M. Knapp, Ferro Machine & Foundry, Inc.; W. S. Brunk, Headford Bros. & Hitchins Foundry Co.; and E. L. Roth, Motor Castings Co.

S. C. Massari, Hansell-Elcock Co., Chicago.

"If your cost system is used only as a measure of past performance, cost-wise, and as a basis for future selling prices then you are not getting the most out of it," C. R. Culling, Carondelet Foundry Co., St. Louis, said as first panel speaker. He urged collecting and using cost information on day-to-day or week-to-week basis as a constant check on operations. He pointed out that indirect molding labor should be budgeted against direct labor or on a tonnage basis to give a weekly check on cost balance. Standards can also be established in the core, the melting, and the cleaning departments.

In establishing par or standard for a department, he advised, be sure to take into account the factors which influence the proportionate amount of indirect to direct labor. The information can be used to indicate each week, not only departmental but also overall plant efficiency. He showed how records which most plants already keep can be made to give a running index of operating efficiency.

Monthly Profit and Loss

Mr. Culling said that monthly instead of quarterly gathering of full departmental costs makes possible more frequent adjustment and also puts the foundryman only one step away from a monthly profit and loss statement and balance sheet. He recommended individual cost records for each important job.

James H. Smith, Central Foundry Div., General Motors Corp., Saginaw, Mich., presented *"Methods Engineering as a Tool for Management"* in the form of motion pictures on methods engineering and on shell molding he had used in conjunction with the Hoyt Lecture (AMERICAN FOUNDRYMAN, June 1953, pp. 42-47) at the 1953 AFS Annual Convention. General Motors is interested in making jobs as easy and efficient as possible to eliminate wasted energy and improve working conditions, Mr. Smith said in introducing the films. Program for improving methods is continuous, he indicated, pointing out it results in improved quality, reduced costs, relief of monotony and fatigue, and a much more satisfied and efficient employee.

Summary

Final panel speaker was Thomas W. Curry, Lynchburg Foundry Co., Lynchburg, Va. Speaking on *"Should You Adopt Shell Molding,"* he summarized his company's experience with gray iron castings in the range of ½ to 40 pounds:

1. If all critical dimensions are in on side of the shell, casting tolerances of ± 0.002 in. per in. are possible.

2. If critical dimensions are across the joint of the shell or if a core is set in the mold, the dimension will be a minimum of 0.03 in. in excess of the pattern dimension.

3. Certain types of castings, such as a wheel with a long, relatively heavy hub, which are poured in a vertical position require careful back-up to avoid swells on the underside of the hub.

4. 0.02 to 0.03 in. minimum allowance is needed on critical dimensions to which a gate is attached.

5. Out-of-roundness is encountered when the critical dimensions are all in one side of the mold, especially when castings are poured in a vertical position.

6. Straight flat surfaces are difficult to produce; shell warpage and shell assembly contribute to the difficulty. To eliminate, apply the same amount of heat during curing to both sides of the shell.

Lynchburg has not found a single exception when a casting molded in green sand was replaced with a shell-molded casting that the latter was not

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S. C. Massari

C. R. Culling

J. H. Smith

T. W. Curry

Members of speaker panel on management techniques at G.I.F.S. 25th anniversary meeting in St. Louis. Mr. Massari headed group.

Conference Held At Michigan State College

GATHERING at Michigan State College's Kellogg Center in East Lansing, foundrymen from the entire state attended the 1953 Michigan Regional Foundry Congress, October 8-9. The meeting was sponsored by the following AFS Chapters: Detroit, Central Michigan, Saginaw Valley, Western Michigan; and Michigan State and University of Michigan Student Chapters.

General Conference Chairman was David Boyd, Engineering Castings Co. Lorin G. Miller of Michigan State College was Honorary Chairman. Other officials included Kenneth H. Priestley, Vassar Electroloy Products Co., vice-chairman; Kenneth Packer, University of Michigan, secretary; and Prof. Charles Sigerfoos, Michigan State College treasurer. W. J. Cannon, Nugent Sand Co., headed the program committee; Jess Toth. Harry W. Dietert Co., was chairman of entertainment;Prof. Sigerfoos, the finance committee. H. A. Deane, Campbell, Wyant & Cannon Foundry Co., headed the educational committee; and Harry W. Gravlin, Ford Motor Co., was in charge of publicity.

The technical sessions opened with O. J. Myers, Archer-Daniel-Midland Co., speaking on "D-Process Molding." Chairman was F. S. Brewster, Harry W. Dietert Co. Principal advantage of the D-process, said Myers, Was the production of a light mold, with good surface finish and dimensional accuracy, using standard foundry equipment.

"Water is poison to the D-process," said Myers, who described the process in some detail. Fine, dry sand is essential for good surface finish, using a viscous oil binder. He listed the advantages of the process as: cheaper cost, smoother finish with less machining, a cleaner shop, less need for highly skilled labor, simpler control. Disadvantages are a lower green strength, and longer baking cycle required. However, obnoxious odors and warping are minimized. The process,

Dr. Richard Schneidewind, University of Michigan, listens intently to H. H. Wilder, Vanadium Corp. of America.

O. J. Myers, Archer-Daniels-Midland Co., explains a point to W. W. Maloney, AFS Secretary-Treasurer.

Vic Crosby (left), Climax Molybdenum Co., carried his Mississippi humor into the banquet hall at Kellogg Center, left Michigan Conference foundrymen in high good spirits. He was followed by several acts of variety entertainment to round out the evening's program. Among the technical speakers at the Conference was T. E. Barlow (right), Eastern Clay Products Co., who spoke on high pressure molding experiments and the outlook for this new foundry technique.

Foundrymen took time out for luncheon at Kellogg Center on first day of the Michigan Regional Conference. (*Left*) From left: O. J. Myers, Archer-Daniels-Midland Co.; E. J. Passman, Frederic B. Stevens, Inc.; and F. S. Brewster, Harry W. Dietert Co. (*Right*) Shown, from left: Jess Toth, Harry W. Dietert Co.; David Boyd, Engineering Castings Co., and General Chairman of the Regional Conference; and W. J. Cannon, Nugent Sand Co. Food was prepared and served by students of M.S.C.

he continued, will handle any alloy, any size, at almost any temperature. After a comparison with the C-process of shell molding, Myers concluded with a caution to the foundrymen to explore all the possibilities of green sand before experimenting with new techniques.

T. E. Barlow, Eastern Clay Products Co., delivered a paper on high pressure molding, based on a research project at the University of Wisconsin. R. D. Harrison, Saginaw Malleable Div., General Motors Corp., presided over the meeting. The foundrymen heard Barlow outline the basic techniques of high pressure molding. Waterless sands must be used at the 600 psi pressures, since water is no longer stable at those points. No flasks are needed, he pointed out, since sand is rigid under pressures. Warpage and parting line problems are virtually eliminated and sand is easily re-usable. Only dry resins are needed at these pressures, which produce molds that are apparently more flexible than shells and have excellent tolerance characteristics in reference to pattern dimensions.

Luncheon

At the luncheon meeting on October 8, Fred J. Walls, International Nickel Co., presided. He introduced Prof. Lorin G. Miller, retired dean of engineering, Michigan State College, who welcomed the visiting guests and commented on the difficulties of providing adequate educational facilities for the ever-increasing student load. William W. Maloney, Secretary-Treasurer of AFS, addressed the meeting, reviewing the highlights of his recent trip to the International Foundry Congress in Paris. He also gave a brief summary of AFS activities and the scope of the Society's function as the industry technical organization.

The afternoon session opened with a paper by Theodore Redin, William Demmler & Bros., who spoke on "Blowing Green Sand Molds." John Van Haver, Sealed Power Corp., was chairman of the meeting. Green sand molds, handled in this manner, said Van Haver, are not a recent development and will not revolutionize the foundry industry.

1924 Experiments

Experiments began as long ago as 1924, when an unsuccessful mold blower was built. At the present time, one machine only is in production use, and has been operated for about four months. The method will need precision flasks, Van Haver declared, for accurate draw. A special shakeout is required so as not to mar the flasks. The ultimate potential of the machine would seem to be in the order of 2000 flasks in eight hours.

Using a series of slides, R. H. Sutter, Sutter Products Co., discussed shell molding machines. Chairman of the session was H. H. Laforet, Lakey Foundry Co. Mr. Sutter described his experiences in manufacturing machines for shell molding, beginning in 1950. One of his first models weighed 20 tons and performed 30 operations automatically. The pattern was invested, rolled, cured, and striped. A later single-station machine was designed with internal pattern heating. The human element was almost completely eliminated, claimed Sutter. Although current models are bringing virtual automation to the foundry, he warned that his organization was still "cutting its teeth" in the process.

Following his speech, Mr. Sutter introduced Austin S. Beech, Foundry Equipment, Ltd., who manufactures the Sutter products in England. Mr. Beech showed a film on shell molding practice in Britain, with running commentary.

Prof. Charles C. Sigerfoos, Michigan State College (second from left), greets visiting educators from Michigan schools.

A. W. Demmler, Campbell, Wyant & Cannon Foundry, presided over the next session, at which R. H. Zoller, Zoller Casting Co., spoke on "Unlined Cupola and Operation Practice." Describing a refractory-less cupola using water for cooling, Mr. Zoller said it has been in operation now for about 15 months. With a water refractory, slag contamination is minimized, he stated, enabling a closer control of iron quality. Tonnages are increased, according to Zoller, and up to 80 per cent of repair and cleaning labor is eliminated. One man now operates, repairs, taps the cupola, analyzes slag every hour, and makes chill tests.

Jess Toth, Harry W. Dietert Co., presided at the evening banquet, and

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Shipyard Visit, Technical Sessions Feature Northwest Regional Conference

The 1953 Northwest Regional Foundry Conference is reported by Harold R. Wolfer, Puget Sound Naval Shipyard, Bremerton, Wash.

■ Technical papers, a visit to the Puget Sound Naval Shipyard, and a demonstration in the University of Washington foundry laboratory highlighted this year's Northwest Regional Foundry Conference. Held October 16 and 17 in Seattle, Wash., the conference was sponsored by the Washington, Oregon, and British Columbia Chapters, and the Oregon State College Student Chapter, in cooperation with the University of Washington.

The conference opened with a visit to the Shipyard. Some 80 foundrymen took the ferry to Bremerton where they toured the yard in busses to view the moth-balled inactive fleet, the conversion of several aircraft carriers, and the foundry and pattern shop. In the pattern shop, in addition to usual patternmaking activities, construction of a scale model aircraft carrier was in progress. Features of the foundry visit included pouring of an electric steel heat and a salvage operation in which scrap shell casings are melted and cast into ingots.

In the afternoon, conference technical sessions opened at the New Washington Hotel, Seattle, with a welcoming address by Conference Chairman E. D. Boyle, Puget Sound Naval Shipyard. First technical talk was by L. W. Eastwood, Kaiser Aluminum & Chemical Corp.; subject was *"Gases in Metals."* Wm. R. Pindell, Northwest Foundry & Furnace Co., presided.

Dr. Eastwood confined his presentation to reactions responsible for gas evolution during solidification of castings. High gas content of foundry melts is best avoided, he said, by combining good melting methods with sound degassing practices. In general, aluminum, magnesium, and strongly reducing copper-base alloy melts are usually degassed by passing a suitable fluxing or scavenging gas through the melt.

Bronzes, low-zinc brasses, Cu-Sn-Zn, and Cu-Sn-Zn-Pb alloys are usually degassed by melting under oxidizing conditions, which produce a high oxygen content and a low hydrogen content in the melt. This is followed by a deoxidizing treatment, thereby producing melts of low oxygen as well as low hydrogen content.

Hydrogen is removed by self-degassing which occurs as a result of zinc vapor evolution in melts of high zinc brasses. Hydrogen and nitrogen are removed by carbon monoxide evolution induced in ferrous and nickel melts by adding oxygen while the melt is in the furnace or ladle.

West Coast Refractory Practice

Following remarks by Wm. L. Mackey, chairman of the Washington Stove Works, host chapter, John T. Roberts, Gladding, McBean & Co., presented a paper on refractories prepared by A. Lee Bennett of the same company. Session chairman was M. J. O'Brien, Jr., Atlas Foundry & Machine Co.

The paper reviewed recent general foundry developments and brought out the three major types of cupola linings in use on the West Coast—gun-placed mix, siliceous well-burned intermediate duty block, and very hard high-duty block. Large ladles are lined with ladle brick or clay-ganister mix, the former being favored by the speaker because it led to less refractory particles in the melt.

In electric furnace linings, acid practice favors a ganister bottom, silica sidewalls, and a silica crown. Basic construction has been of rammed or chrome-magnesite sidewalls, and silica roof. Extension of recent experiments in the use of super-duty fireclay brick for roof was recommended. Regardless of the type of the roof, heating of the new roof to cause slight softening of the inner face was recommended to relieve strains and reduce brick breakage.

First day's activities ended with the conference banquet. Toastmaster was Charles M. Anderson, Eagle Foundry Co. He called on National Director O'Brien and Herbert F. Scobie, technical editor of AMERICAN FOUNDRYMAN, for remarks on the proposed revision of the By-Laws and on the the Society Headquarters. Dr. Warren E. Tomlinson, College of Puget Sound, spoke on *"Problems of Germany and Yugoslavia —1953."*

Conference technical sessions the second day were held at the University of Washington. At the first session, Harry H. Kessler, Sorbo-Mat Process Engineers, St. Louis, spoke on basic cupola practice. James F. Dolansky, Griffin Wheel Co., presided.

Interest in the basic cupola has been heightened by desire to produce low-sulphur metal for nodular iron, the speaker said. Basic melting gives, in addition to lower sulphur, higher carbon and higher temperature. The coke remains free of slag, Mr. Kessler stated, resulting in faster oxidation and higher carbon pickup.

Slag depth as much as 20 inches was recommended. Sum of calcium oxide and magnesium oxide should be 1½ to 2 times to silica content of the slag, the speaker said. Silicon loss is as high as 60-70 per cent of the silicon charged while manganese loss is only about half as much as in acid operation.

Mr. Kessler described an unusual heat in a water-cooled cupola (pipes running vertically in the refractory of the melting zone) in which the heat was started in the morning on the acid side, switched over to basic in the afternoon, and then gradually returned to acid operation.

The latest AFS research film, *"Effect of Gating Design on Casting Quality,"* was shown to illustrate how casting defects such as dross, inclusions, and entrapped gases result from improper sprues, runners, and gates which cause turbulence, aspiration, and entrain-

ment of air. It was demonstrated that these difficulties are eliminated by properly designed pouring basins, tapered sprues, enlargements and wells at the base of the sprue, coupled with runners with rounded corners which are reduced in cross-section as they pass the ingates produces sound castings.

The next speaker was Clifford E. Wenninger, National Engineering Co., Chicago, who told how used sand can be reclaimed pneumatically. Session chairman was Prof. Edward A. Rowe, University of Washington.

In use, sand grains develop shells of clay and fines which burn on, then crack under impact and heat. Result is an increase in proportion of fines and coarse grains in the sand mix, declared Mr. Wenninger. He illustrated and described the operation of a pneumatic unit which causes sand grains to impinge against each other, cracking the clay shells and carrying them out into a cyclone dust collector. Reclaimed sand can be used for the same purposes as new sand.

At the luncheon meeting, principal speaker was Dr. J. H. Manley, University of Washington, who spoke on *"Atomic Energy."* He discussed some of the practical aspects of producing electrical power, pointing out that the comparatively high cost of distribution reduces considerably the potential savings. Engineering Dean H. E. Wessman welcomed foundrymen to the campus on behalf of the university. Toastmaster was Prof. G. S. Schaller.

Shell Molding

Bernard N. Ames, New York Naval Shipyard, Brooklyn, spoke on *"Shell Molding"* at the early afternoon technical meeting. A major contribution of shell molding—the first basic change in mold construction since the inception of the foundry art—is the directing of attention toward improved green sand practices and the stimulating of new molding methods, Mr. Ames said. He reviewed improvements in equipment and materials in shell molding.

Regarding precision, Mr. Ames indicated that it is important in discussing any molding method to cite in quantitative language what the potential of the process may be for various alloys, and for different weights and design of castings. Dimensionally, the shell molding process may be considered midway between sand casting and the lost-wax technique. If castings approaching the size commonly made in shell molds were manufactured by the lost-wax process, he believed no greater precision would be obtained, Mr. Ames declared.

James N. Wessel, Puget Sound Naval Shipyard, presided at Mr. Ames' session and at the following session at which the speaker was Frank K. Shallenberger, Shalco Engineering Corp.

Mr. Shallenberger discussed the various shell molding machines available to the foundry industry and compared them on the basis of design, cost, operating characteristics, and suitability to different foundry applications. He recommended shell molding as a promising answer to the current slump in foundry volume, at the same time advising that foundrymen should approach shell molding with their eyes open. They should recognize, he stated, that intelligence, ingenuity, effort, and development of new know-how are essential to full realization of the potential of the process.

At the conclusion of the technical meetings foundrymen witnessed a demonstration of shell molding and an exhibit of olivine sand castings, the latter under the direction of Prof. Wm. A. Snyder, in the University of Washington foundry laboratory.

For the Ladies

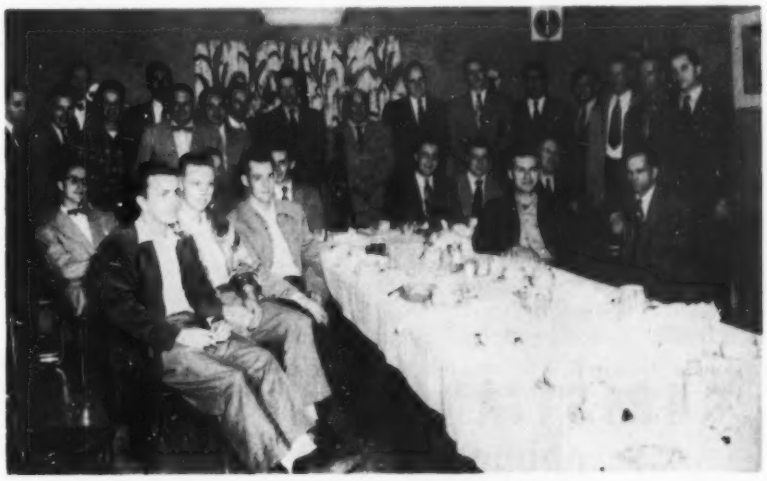
While foundrymen were in session at the university, the ladies attended a luncheon and style show. The conference concluded with a dance and buffet supper at the New Washington Hotel.

In addition to Conference Chairman Boyle, the following participated in planning the two-day meeting, Program Committee—Mr. Dolansky, chairman, and Mr. Mackey; Publicity Committee—Fred R. Young, E. A. Wilcox Co., chairman, Carl P. Irwin, Ingersoll Rand Co., and Harry E. Peltzer, Gladding, McBean & Co.; Reception Committee—James D. Tracy, Salmon Bay Foundry Co., chairman, C. R. Jackson, E. F. Houghton Co., and R. G. Pritchard, Pacific Pattern Works; Finance Committee—Mr. Dolansky, chairman, V. W. Rowe, Ballard Brass & Pattern Works, and Mr. Mackey; Plant Visitation Committee—Harold R. Wolfer, Puget Sound Naval Shipyard, chairman, Mr. Jackson, and Wm. J. Olson of the Shipyard.

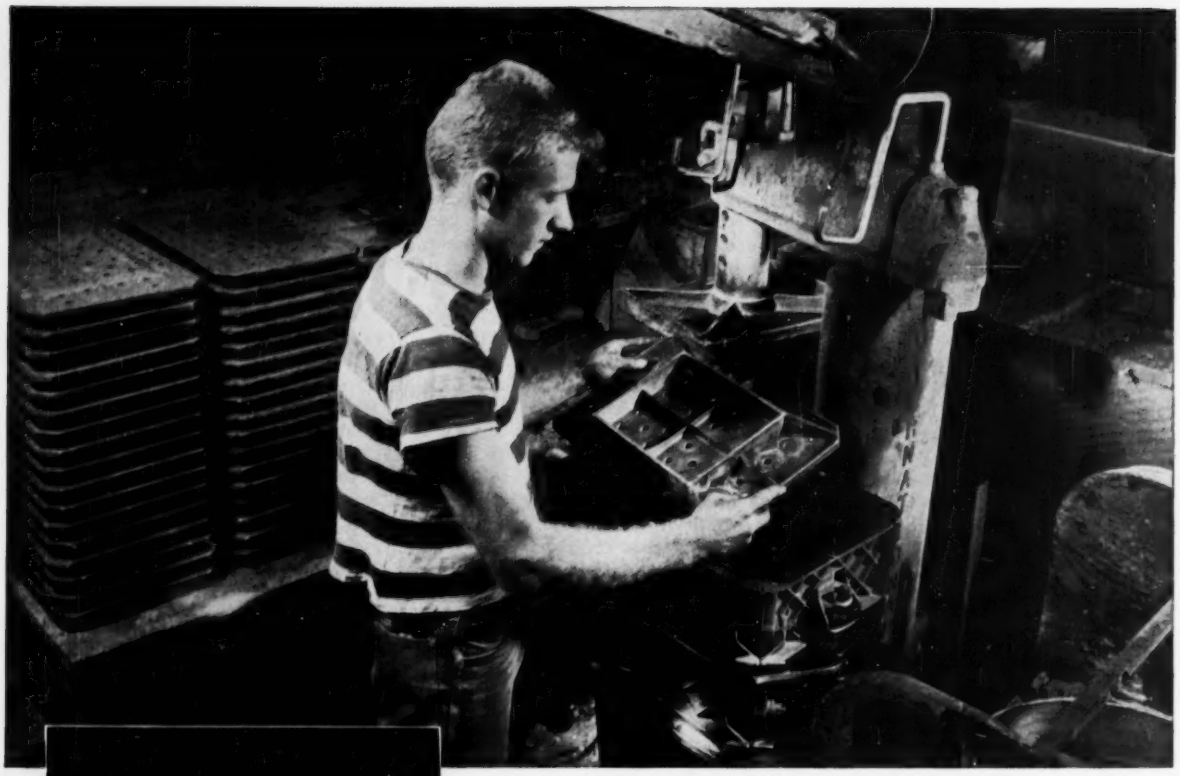
Other committee members were: Accommodations—J. V. Reardon, Federated Metals Div., American Smelting & Refining Co., chairman, and Mr. Irwin; Records—Mr. Wolfer, chairman, and Norman E. Hall, Electric Steel Foundry Co.; Registration—Mr. Irwin, chairman, George Vann, Northwest Foundry & Furnace Co., Lovick P. Young, A-1 Steel & Foundry Co., Ltd., and R. N. Tompkins, Western Foundry Sand; Entertainment—Thomas F. Meagher, Laclede-Christy Co., chairman, and Wm. A. Shaug, South Seattle Foundry; Transportation—Mr. Reardon; Ladies Entertainment—Mmes. Meagher (chairman), Reardon, and Anderson.

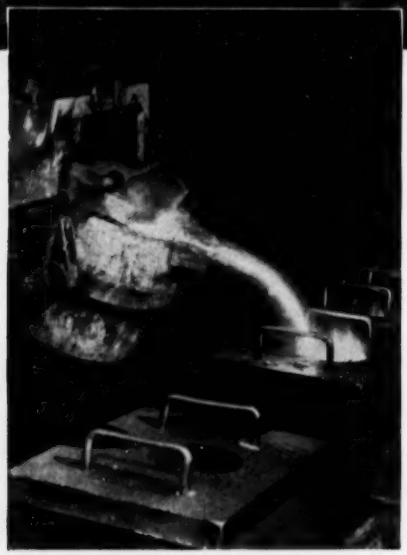
New X-ray Source

A "pocket-size" radiation source for industrial and medical x-ray work has been developed at Armour Research Foundation. Entirely self-contained, the new x-ray source can be made in almost any size, from tiny pellets to large blocks or sheets. A radioactive center emits beta rays which propagate x-rays in penetrating a surrounding layer of some heavy metal.



Representatives of Spokane Steel Foundry Co., Miller & Poston, Precision Casting Co., Travis Pattern & Foundry, Kaiser Aluminum & Chemical Corp., Linde Air Products Co., Western Light Metals, and Spokane Pattern Engineers met in Spokane, Wash., October 15 to view films on gating design and flame washing. John Tenold, Spokane Steel Foundry Co., and Robert L. Burke, Miller & Poston Mfg. Co., organized the meeting. Principal speaker was Herb Scobie of *American Foundryman*.





"Our molders (see top photo) prefer Edco Bottom Boards because they are lighter and easier to handle . . ."

"Our EDCO Dowmetal Bottom Boards Hold Up at High Temperatures . . ."

says ROBERT H. GARRETT, General Foreman
LEBANON STEEL FOUNDRY, LEBANON, PENNSYLVANIA

Lebanon Steel Foundry, a three-year-user of Edco Bottom Boards, is a producer of high quality stainless, special alloy, and carbon steel castings.

"In pouring steel at high temperatures ranging from 2900 to 2980 degrees F., we have found that our Edco Dowmetal Bottom Boards require replacement much less frequently than wood boards" reports General Foreman Garrett.

"Because we use thousands of bottom boards in our operation," he continues, "the fact that we can stack Edco boards in less than half the space required by wood boards is a real advantage. Our molders prefer Edco magnesium Bottom Boards because they are lighter and easier to handle than wood boards."

Lebanon Steel Foundry is typical of scores of foundries, of all types and sizes, that are switching to Edco Dowmetal Bottom Boards because of their performance *and permanence.*

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35th Annual Meeting Held By F. E. M. A.

Convening its 35th Annual Meeting, the Foundry Equipment Manufacturers' Association held its 1953 session at the Greenbrier Hotel, White Sulphur Springs, W. Va., October 15-17.

In addition to transacting other association business, the following officers were elected for the coming year: *President:* W. B. Wallis, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, Pa. *Vice-President:* D. E. Davidson, vice-president for sales, Link-Belt Co., Chicago.

New members added to the board of directors were: W. G. Frank, executive vice-president, American Air Filter Co., Inc., Louisville, Ky.; R. J. Hines, vice-president and general manager, Hines Flask Co., Cleveland; and O. H. McCleary, vice-president and general manager, Mathews Conveyor Co., Ellwood City, Pa.

New Secretary

F.E.M.A. also elected a new executive secretary-treasurer, Arthur J. Tuscany, Jr., who succeeded his father, who had held the position for 18 years.

The three-day sessions opened with a series of product group meetings in the morning and afternoon of the first day. The evening featured a reception by new president and Mrs. W. B. Wallis.

The morning of the second day was devoted to a general session, presided over by outgoing president Claude B. Schneible. The situation in Washington was reviewed by C. V. Nass, Beardsley & Piper Div., Pettibone-Mulliken Corp.; and Thomas Kaveny, Jr., Herman Pneumatic Machine Co. The meeting also heard statistical reports by D. E. Davidson, Link-Belt Co.; and E. A. Borch, National Metal Abrasive Co.

Delegates to the meeting played golf in the afternoon, attended a reception and the annual banquet in the evening. W. B. Wallis was chairman at the dinner, where W. J. Grede, president, Grede Foundries, Inc., Milwaukee, was guest of honor.

Final Day

Two general sessions were held on the closing day. At the morning meeting, E. A. Borch discussed activity in the foundry equipment industry. An ensuing round table discussion covered the outlook for the equipment manufacturers.

After luncheon Claude B. Schneible and W. B. Wallis both reported on FEMA participation in the National Castings Council, and on the recent International Foundry Congress at Paris.

The presentation of new officers brought the meeting to a conclusion.

Foundries In Fair Exhibit

Pointing up the growing need for recruitment of youth for the industry, eight Wisconsin malleable iron foundries recently joined together to co-sponsor an educational exhibit at the Wisconsin state fair.

Graphically featuring the occupational opportunities for young men in the foundry generally, and the malleable plant in particular, the exhibit also spotlighted products which utilize the peculiar qualities of malleable iron: toughness, unusual resistance to impact, and good machining properties.

A group of malleable iron foundries co-sponsored this educational exhibit at the Wisconsin state fair, featuring color motion picture presentation.

Show Technicolor Film

Another feature of the exhibit that attracted much spectator interest was the continuous showing of various scenes from *This Moving World*, a 16-mm film in technicolor, developed by the Malleable Founders' Society. Approximately 10,000 persons visited the exhibit and talked with representatives of the participating firms.

All located in the state of Wisconsin, the following foundries worked together in presenting the malleable story of opportunity at the fair: Badger Malleable and Manufacturing Co., South Milwaukee; Belle City Malleable Iron Co., Racine; Chain Belt Co., Milwaukee; Federal Malleable Co., West Allis; International Harvester Co., Waukesha Works; Kirsch Foundry, Inc., Beaver Dam; Lakeside Malleable Castings Co., Racine; and Milwaukee Malleable and Gray Iron Works, Milwaukee.

Report on Paris Congress

International Committee President L. N. Shannon (left) receives Grande Medaille d'Honneur from M. Pierre Bellier.

With more than 1100 foundrymen from 23 countries in attendance, the 1953 International Foundry Congress was held in Paris, France, September 19-26. Approximately 200 Americans were present, with the majority of them coming from the ranks of American Foundrymen's Society.

Host to the Congress was L'Association Technique de Fonderie de France, of which M. Paul Muguet is president. In that capacity, M. Muguet also served as president of the Congress.

The principal guest at the sessions was L. N. Shannon, 1953 president of the International Committee of Foundry Technical Associations, and a Past-President of AFS (1940-41). Mr. Shannon was honored at the closing ceremonies at the Sorbonne, when he was presented the *Grande Medaille d'Honneur*, along with M. Pierre Chevenard of France.

AFS Officials

Official AFS delegates at the Congress were current President Collins L. Carter, and immediate Past-President I. R. Wagner. Society Past-President Walter L. Seelbach and Secretary-Treasurer William W. Maloney were official delegates for International Committee meetings. W. B. Wallis and R. J. Teetor were other AFS Past-Presidents also attending the Congress.

(Left) Scene at final banquet, Palais d'Orsay. From left, Mrs. I. R. Wagner, Mr. and Mrs. Gallagher, AFS Secretary-Treasurer W. W. Maloney and Mrs. Maloney, and C. W. Williamson. (Right) Pictured in grounds of Sorbonne: Rear, from left: Mr. Maloney, M. Pierre Bellier, Past AFS President W. L. Seelbach. Front row, from left: Immediate Past President of AFS, I. R. Wagner; International Committee President L. N. Shannon; and AFS President Collins L. Carter.

In addition, eight current and past national Directors of AFS made the trip to Paris.

In the election of officers for the International Committee, M. A. Brizon, a past president of L'Association Technique de Fonderie de France, became the new president. The honor of naming a vice-president was delegated to Sweden, whose representatives will report at a later date. M. T. Makemson, secretary-General of the Institute of British Foundrymen, was re-elected as honorary secretary of the International Committee.

At five technical sessions held during the week, more than 60 papers were presented to the Congress. The official exchange paper for AFS was prepared by W. S. Pellini, Naval Research Laboratory, Washington,D. C. His subject was: *Relation of Riser Range and Feeder Adequacy*. The paper is being printed in AMERICAN FOUNDRYMAN in two parts, beginning in November, 1953, and concluding with this issue.

One of the highlights of the Congress was a visit to the Technical Center at Sèvres, where research and experimentation in every phase of the foundry industry are carried out. The visitors were also guests at several receptions, including one at the Hôtel de Ville by the city of Paris, the Chamber of Commerce of Paris, at the Sorbonne, and the Technical Center.

Plant Visits

A comprehensive schedule of plant visitations was arranged for the visiting foundrymen. Included were Bruneau Foundry (light metals) at Orléans; Gailly Foundry (malleable iron) near Chartres; Snecma Co. (aluminum and magnesium); Bonvillain & Ronceray (gray iron); Codart & Dubru (brass and bronze); Montupet Foundry (aluminum alloys); Cromback Foundry (malleable iron); Sèvres Porcelain Works; and Legnisel & Blanchard Foundry (steel). These plants gave the delegates a good cross-section of French metals casting practice.

One of the more important points discussed during the International Committee meetings was a proposed exchange of foundry personnel between member nations. Such a procedure would be above the apprentice level, and would extend to skilled and professional personnel. The value of such an exchange could be inestimable, and the proposal will be referred to the AFS Board of Directors at its next meeting.

The International Congress was awarded to Florence, Italy for 1954, and to London in 1955. No commitments were made beyond that date.

Social events were numerous and highly diverting for the foundrymen and their ladies. Among them were a Christian Dior mannequin parade, visits to the Louvre, Montmartre, and Versailles. An especially interesting day was spent at the historic Château de Dampierre, on the outskirts of Paris, where the visitors were guests of the Duke and Duchess de Luyness at a musicale and luncheon.

Following the Congress, most of the Americans left on tours of the Continent and England. The most popular of these tours included the French Riviera, Italy, Switzerland, Black Forest and the Rhine country, Belgium, and England.

After a stay on the Mediterranean resort coast of Southern France, this group went to Rome, where

Touring foundry group is shown at private audience with Pope Pius XII at Castel Gandolfo, his summer residence.

The Chateau Dampierre was one of the high points in the tours of the immediate vicinity of the city of Paris.

While in Rome, the foundrymen and their ladies visited such historic spots as the ruins of the Colosseum.

a private audience with Pope Pius XII was arranged and held in Castel Gandolfo, his summer residence. On leaving Rome, the tour party went to Venice and then to Milan, where they visited the Alfa Romeo Automotive Foundry and were accorded a reception by the Associazione Italiana di Metallurgica.

From Milan, they went to Lucerne and then to Zürich. At the latter point they visited the famous George Fischer plant at Schaffhausen. A reception was held for them by the Swiss Foundrymen's Association at the Guild Haus in Zürich.

Entering Germany at Wiesbaden, the party took a Rhine steamer down river to Coblenz, thence by bus to Cologne. While in Cologne, they were scheduled to cover the Ruhr industrial district, and the German Foundrymen's Association was to meet with them at luncheon in Essen.

Purdue Metals Conference

THE 6th Annual Metals Casting Conference was held October 29-30 at Purdue University under the sponsorship of the school and the Michiana and Central Indiana Chapters of the American Foundrymen's Society. Technical talks covered safety, automatic core and mold production, pneumatic sand transfer, dust collection, gating and risering, and metal shrinkage.

The conference was opened by the chairman, James A. Barrett, National Malleable & Steel Casitngs Co., who turned the meeting over to H. A. Bolz, head of the General Engineering Dept. Associate Dean W. A. Knapp, introduced by Prof. Bolz, greeted the foundrymen on behalf of the university and outlined Purdue's off-campus educational activities.

Don't Bet Your Life

AFS Vice-President Frank J. Dost, Sterling Foundry Co., Wellington, Ohio, commended conference workers for their efforts on behalf of the industry and outlined various technical activities of the Society. He cited the committee workers who develop the Convention program, oversee research, write for AMERICAN FOUNDRYMAN, and prepare handbooks and other AFS publications. All Society publications are available to anyone, member or not, he said, and are priced at a strong discount to members.

Mr. Dost urged full management support of the industry's Safety & Hygiene & Air Pollution program. He invited all companies to participate in the renewed solicitation for additional funds for the construction of the new Society headquarters.

"Don't Bet Your Life" was the topic of Clyde R. Powell. Lehigh Safety Shoe Co., Endicott, N. Y., who emphasized his story with feats of magic and hypnotism. You're playing the game of life for keeps, he said, warning that there's no second chance in emphasizing the seriousness of the loss of a finger, an eye, a hand, or a life.

Suggesting that the old motto "Look before you leap" is a good safety slogan, the speaker declared that there never had been an accident that couldn't have been prevented by looking ahead. It is necessary to overcome the feeling some workers have that "an accident can happen to somebody else but not to me." Point out how ridiculous a man looks in risking life or limb in an accident, he advised.

In the afternoon, the first speaker was C. W. Hockman, Cadillac Motor Car Div., General Motors Corp., Detroit. Speaking on automation of mold and core production, he was introduced by J. P. Lentz, International Harvester Co., who presided at the session.

Automation is relatively under-developed in the foundry, Mr. Hockman said, suggesting that it promises fuller utilization of men, materials, and machines. As an example of automation, he described two five-station automatic core blowers in use in the Cadillac foundry where they are set to blow 360 cores an hour each. Manual operations on the machines are limited to placing of driers, loose pieces, and wires, and the removal of cores as illustrated in motion pictures shown by the speaker.

A complete core box can be changed in an average of four minutes, Mr. Hockman said. If necessary to leave a box out temporarily, a limit switch can be set so that the machine continues running the other jobs, skipping the empty station at the blower. Scrap cores from the two machines run 4.8 per cent and 2.8 per cent, both substantially lower than the figures for the same cores on usual equipment.

Air Transports Sand

J. F. Kauffman, Studebaker Corp., South Bend, Ind., described pneumatic conveying of prepared core sand as practiced at Studebaker at a session presided over by G. C. Dickey, Harrison Steel Casting Co. Mr. Kauffman described the equipment used to transmit core sand mixtures to coremaking stations through 4-in. pipe by means of compressed air. He compared operation of the pneumatic equipment with other methods and concluded that no one conveying method is necessarily the best in all cases.

Conference attendants visited the Purdue foundry laboratory after Mr. Kauffman's presentation. They saw a modern small foundry equipped with sand storage and conditioning equipment, furnaces for melting by direct and indirect arc as well as induction and gas, a cupola, and several different standard molding machines including one for stack molding. Cleaning facilities included an airless blast unit; in the core room, core blowers were available for production work.

The conference banquet was held the end of the first day with Dr. Earl Butz, head of the Department of Agricultural Economics, as principal speaker. In developing his topic, *"Production, Progress, and Prosperity,"* he expressed

Clyde R. Powell, Lehigh Safety Shoe Co., makes safety education painless by illustrating safety maxims with magic tricks and hypnotism.

confidence in the present and the future. Prof. R. W. Lindley was toastmaster.

Three papers were presented the second day. Kenneth E. Robinson, General Motors Corp., Detroit, spoke on *"A Million Dollars of Dust Collection Equipment Won't Do a Bit of Good Unless Properly Hooded."* George Adler, Auto Specialities Mfg. Co., presided.

Catch Contaminant at Source

Second paper was *"Some Modern Concepts of Gating and Risering"* by Charles Locke, West Michigan Steel Foundry, Muskegon, Mich. Martin J. Lefler, Oliver Corp., South Bend, Ind., was session chairman. In the afternoon, Clyde A. Sanders, American Colloid Co., Chicago, and Prof. C. C. Sigerfoos, Michigan State College, made a joint presentation on the effect of molding materials on apparent metal shrinkage. Presiding was Robert P. Schauss, Werner G. Smith Co., Chicago.

In his talk, Mr. Robinson emphasized the importance of good air flow into an exhaust system and the need for the minimum number of turns and restrictions. Volume of air not velocity is the critical factor, he said, recommending placing the hood as close to the source of air contaminant as possible.

Approach a ventilation problem by visualizing the operation as entirely enclosed, then visualize the minimum size and number of openings required to carry on the operation. Take care in the use of man-coolers, Mr. Robinson said, since improper positioning can nullify the effects of properly designed hoods by changing the air flow pattern.

Pointing out that an attitude of exactness is more and more prevalent in the foundry industry, Mr. Locke reviewed research which has led to prevent improved knowledge of gating and risering. He outlined results of early pour-out tests at the Naval Research Laboratory to study solidification, and the establishment of the AFS Heat Transfer Committee and correlation of work done for it with Columbia University's heat and mass flow analyzer, with recent NRL pour-out tests.

Riser height is not as significant as riser volume, he said, recommending a short squat cylinder—the closest approach to the ideal riser, a sphere, that is practical to mold. He showed how riser size could be determined on the basis of surface area to volume relationships of the riser and the section of the casting it is expected to feed. Effective feeding distances of risers is being worked out at the Naval Research Laboratory, he pointed out.

Everybody including the speaker enjoys the point AFS Vice-President Frank J. Dost, Sterling Foundry Co., is making in his Metals Casting Conference talk.

Metals Casting Conference planners, left to right, are: Prof. C. T. Marek, Purdue, co-chairman; J. A. Barrett, National Malleable & Steel Castings Co., chairman; J. P. Lentz, International Harvester Co., assistant program chairman; and V. S. Spears, American Wheelabrator & Equipment Corp., program chairman.

(See AMERICAN FOUNDRYMAN, November 1953, pp. 58-66 and December, pp. 66-71.)

In referring to gates, Mr. Locke said that consideration must be given to the inertia of the metal and cited the AFS research on fluid flow leading to recommendations for large rounded radii in gating systems to achieve smooth flow, and reduction of runner cross-section as each in-gate is passed.

Regardless of the metal being poured, you cannot eliminate apparent shrinkage and oversize castings due to mold-wall movement by changing composition, pouring temperature, and other conditions not relating to the sand, Mr. Sanders said in opening the talk on *"Mold Materials and Apparent Metal Shrinkage."* He showed slides of sectioned test castings made in controlled density molds illustrating variations in shrinkage due to sand additives.

Conclusions reached on the basis of the tests were that sea coal and wood flour decreased piping tendency, that southern bentonite appeared to have less piping tendency than western bentonite or fire clay, and that as moisture increases the piping tendency increases.

Test castings made in oil-bonded cores were sound due to inability of the mold wall to move under pressure of the metal. To avoid shrinkage due to mold movement, Mr. Sanders recommended a mold hardness of 60 or above.

Prof. Sigerfoos described the production of small castings, used in the

continued on page 119

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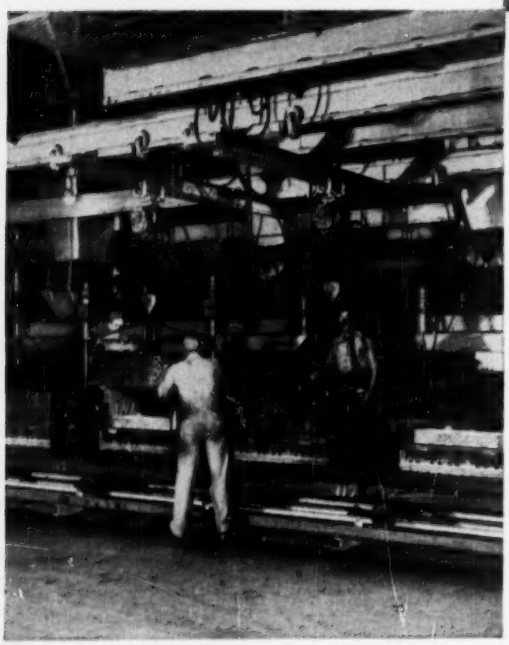

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G.I.F.S. Meets

continued from page 73

found by the customer to be better dimensionally and more consistent in shape, Mr. Curry declared.

Three speakers appeared on the second-day's business session. W. S. Williams, Lynchburg Foundry Co., spoke on *"Work Simplification—a Foundry Opportunity."* Stuart Heinritz, editor, *Purchasing*, had as his topic *"Help Yourself by Helping the Purchasing Agent."* Francis L. Fletcher, Alderson & Sessions, Philadelphia, spoke on *"Marketing in Today's Economy."*

Work simplification is a broad philosophy based on participation of the individual worker in the application of common sense to eliminate waste, Mr. Williams indicated. It calls for making each employee responsible for, and capable of, policing the efficiency of his own job.

Four Principles Involved

Development of this line of thinking in a plant requires a successful program built around management's recognition and application of the following four principles, Mr. Williams stated:

1. The collective brainpower of individual employees is a great potential asset, and it is a worthwhile investment to cultivate that brainpower so that it will be applied to the betterment of the company.

2. Through training, this potential asset can be made effective.

3. The individual can be induced to utilize this trained ability by providing appropriate incentives, and these incentives need not be cash.

4. Channels of communication must be established to assure that employee ideas are evaluated impartially and correctly, and installed when sound.

Williams described Lynchburg's work simplification training and awards program which has resulted in an estimated savings of over $300,000 in six years.

Mr. Heinritz urged purchasers to become acquainted with the products, policies, and practices of sellers. He emphasized the importance of good purchasing practices by pointing out that a variation of 5 per cent in purchasing efficiency can wipe out the profit of a company. Playing off one supplier against another to get the lowest possible, perhaps ruinous, price is an outmoded concept of purchasing, he said. Instead, the purchasing agent should be a "value buyer" who is concerned with ultimate cost, not just immediate cost.

Mr. Fletcher cited examples of economic changes due to research and development and said that the years would bring comparable changes which will affect manufacturing and marketing. Smaller plants may not be in the position to carry on programs of forecasting 10 years ahead, but they can analyze themselves. He suggested that they use the facilities of their trade associations, local university professors, and professional business consultants in marketing and market development. Get out in the field and get acquainted with the customers' problems, he urged.

Introduced Officers and Directors

At the closing luncheon, new officers and directors were introduced and citations and awards were presented. In addition to the officers named previously, the following are new directors:

J. C. Alberts, Plainville Castings Co., Plainville, Conn.; C. H. Meminger, Posey Iron Works, Inc., Lancaster, Pa.; C. H. Ker, Dalton Foundries, Inc., Warsaw, Ind. (incumbent); J. W. Simmons, Jr., Cox Foundry & Machine Co., Atlanta, Ga.; G. L. Nimocks, Dayton Foundry, Hollydale, Calif.; and W. S. Brunk, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa.

Heading the list of award winners was Frank G. Steinbach, editor, *Foundry*, who was honored with the G.I.F.S. gold medal. Also cited for service to the gray iron industry and to the society were Herbert R. Lafferty, Red Jacket Mfg. Co., Davenport, Iowa, and William Beiser, Reliance Foundry Co., Cincinnati.

George K. Stauffer, Reading Gray Iron Castings, Reading, Pa., was awarded a $300 first prize in the 1953 Redesign Contest. Second place and $150 went to A. J. Hall, Hallstead Iron Foundry, Hallstead, Pa. George Green, Textile Machine Works, Reading, Pa., who received a prize in the 1953 competition was awarded an additional $50 on last year's entry.

A.W.S. Announcement

At a meeting of the Board of Directors of the American Welding Society at Houston, Texas, on June 18, 1953, the following resolution was adopted:

> "Under no condition shall the American Welding Society issue a certificate for license to a welder. The Society shall oppose any plan for the certification or licensing of welders that denies a fabricator the privilege of qualifying his own welders."

Rules For Buying Aluminum Castings

The importance of applying quality yardsticks to prospective aluminum castings suppliers is emphasized in the following 12 "rules" which form the nucleus of an article "How to Buy Aluminum Castings" by Floyd A. Lewis.

1. CAREFULLY ESTIMATE the number required and the rate of production so that the most economical casting method can be chosen.

2. DETERMINE the mechanical and physical requirements of the part so that the proper alloy can be selected which will also be suited to the casting method.

3. REQUEST BIDS from several foundries of good reputation that have the experience and facilities to furnish castings of the type desired at the required production rates.

4. SUBMIT DETAILED DRAWINGS and a model or test pattern when available; if a reorder, submit sample casting as previously made.

5. SPECIFY SERVICE CONDITIONS in detail, especially any points of high stress, or pressure-tightness, if required. Indicate machining locating points.

6. ASK PROSPECTIVE SUPPLIERS if they have control equipment, inspection procedures, and laboratory facilities to assure the attainment of specified physical and mechanical properties consistently.

7. IF THE CASTING REQUIRES a high strength alloy, ask prospective suppliers if they have adequate heat-treating equipment with accurate temperature control.

8. IF POSSIBLE, investigate the experience of other customers with prospective suppliers.

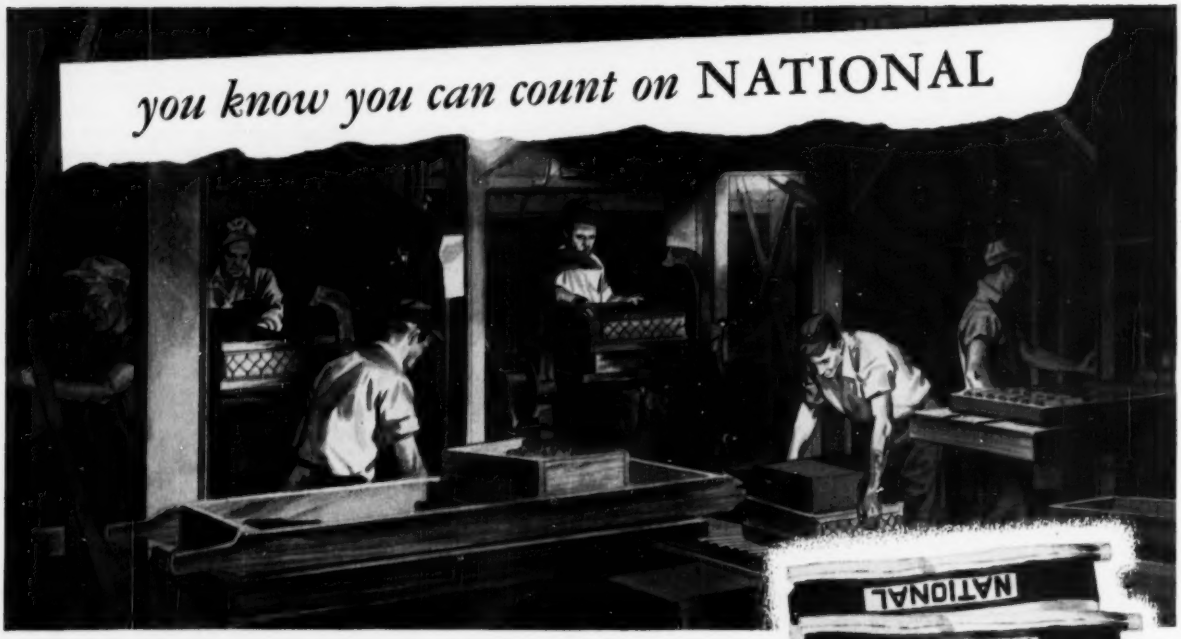
9. AFTER A SUPPLIER has been tentatively selected, visit him and see for yourself whether he has the sort of plant where you would like your castings to be made.

10. DON'T GIVE your order to the lowest bidder unless you are satisfied that he will produce good quality castings at the lowest over-all cost. Sometimes difficulties with machining and finishing and in adjusting rejects will wipe out any apparent savings.

11. AFTER CHOOSING A SUPPLIER, provide for the fullest possible consultation and collaboration between your design engineers and his technical personnel.

12. GIVE CAREFUL CONSIDERATION to any changes the foundryman suggests that might simplify production, reduce cost, or result in better castings.

Reprinted from The Aluminum Association bulletin.



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Many experienced foundrymen, like those pictured above, have depended on National Bentonite for better bonding of their molds. They know they can count on National's consistently uniform high quality, good green strength, high hot strength and many other characteristics which contribute to better bonded molds. For years they've found this means better production, with better castings requiring less time in the cleaning room.
You, too, can be sure of better bonds with NATIONAL BENTONITE.

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New England Regional Hears Foundry Experts

FOURTEEN organizations active in the field of metals joined in co-sponsoring the 13th New England Regional Foundry Conference, held October 23-24, 1953.

In staging the meeting, New England Foundrymen's Association worked with Massachusetts Institute of Technology, AFS and its M.I.T. Student Chapter, and other regional and national metals groups. The two-day sessions were held on the campus of M.I.T. in Cambridge, Mass.

Frank R. Elliot, Westinghouse Electric Corp., Springfield, Mass., served as chairman of the Conference. Vice-Chairman was Joseph B. Stazinski, manager, Everett and Lynn Foundries, General Electric Co., and also president of New England Foundrymen's Association.

Technical programs were divided into ferrous and non-ferrous groups. Howard B. Nye, Crompton and Knowles Loom Works, Worcester, Mass., headed the ferrous committee; and Frank G. Volpe, Somerville Machine and Foundry Co., Somerville, Mass., was chairman of the non-ferrous program group.

After the Conference was declared open by Chairman Elliot, the foundrymen were welcomed by Admiral C. L. Cochrane, dean of engineering, M.I.T. "The 'rule of thumb,'" said Admiral Cochrane, "has lost its place in metallurgy and the foundry." Instead, the cast metals industry is becoming more and more an exact science.

The Admiral made a strong plea for the humanities in an engineering education, then stressed the tremendous value of accurate communications in business. He looked into the past, traced some of his experiences in the navy, and extended a cordial welcome to the foundrymen.

H. H. Wilder, Vanadium Corp. of America, Detroit, opened the ferrous discussions with a summary of recent developments in the foundry industry. Clyde Lake, Hyde Windlass Co., Bath, Maine, was chairman; F. C. Perkins, Jr., Henry Perkins Co., Bridgewater, Mass., served as co-chairman.

Mr. Wilder briefly reviewed current progress in molding methods, including green and dry sand, shell and pressure molding, and the contour drier D-process. Melting techniques were covered in some detail, emphasizing various types of cupolas and furnaces.

After a look at each of the metals commonly cast in American foundries, he explored recent trends toward mechanization, with stress on automation and its enormous portent for the future of our industrial order. Scrap and quality control were enumerated, and Wilder ended with a summation of future research needs in the industry.

Advances in Shell Molding

"Some Aspects of Shell Molding in the Non-Ferrous Foundry" was the subject of a paper by G. J. Jackson, Walworth Co., Boston. Shell molding has the greatest potential for automation, declared Mr. Jackson, who illustrated his remarks with colored slides. In four years, he continued, the manufacture of shells has become as fast as the fastest green sand.

Surface finish of shells is largely determined by sand fineness, although they are dependent on flowability for good detail and finish. Since this characteristic is controlled by the resin, it should allow suitable compacting of grains. Increasing fineness, Jackson indicated, can cause decreasing flowability, particularly with vertical surfaces. Another serious problem is deflection of shell walls during pouring, a problem that must be solved through proper choice of sands. Accurate control, Jackson concluded, is essential in shell molding, with particular reference to investing, gating, melting, and pouring.

S. W. Chappell, Jr., General Dynamics Corp., Groton, Conn., presided over the meeting assisted by co-chairman F. B. Duncan, William Duncan Co., East Boston, Mass.

Maintenance will assume increasing importance as automation spreads to the foundry. That was the principal thesis of G. E. Miller, Osborn Mfg. Co., Cleveland, whose paper was entitled, "Maintenance of Foundry Equipment." C. W. Hutchins, Standard Foundry Co., Worcester, Mass., presided. Co-chairman was L. J. Litalien, Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

A good maintenance department will pay large dividends, said Miller. Down-time for maintenance and repair means a tonnage loss, with resulting drop in sales and profit to the foundry. Equipment and machinery records will aid the maintenance department to operate efficiently, asserted Miller, who used sample cost sheets to demonstrate his points. Spare part storage and general lubrication procedure were two of the primary points used by Miller in his paper.

Clear Job Understanding

R. F. Meader, Whitin Machine Works, Whitinsville, Mass., was chairman of the final session of the first day of the Conference. Speaker was J. W. O'Toole, Crompton and Knowles Loom Works, Worcester, Mass. Co-chairman P. T. Mongeau, Joy Mfg. Co., Claremont, N. H., assisted.

Speaking on "Foreman Training in the Foundry," Mr. O'Toole built his paper around a job description of a molding foreman in his own company. Function, type of equipment, operations, and responsibilities were the overall categories in the description, to which was added a job routine sheet, setting up daily work routines and responsibilities.

O'Toole advocated a training tool known as "role playing" in order to go through each item on the routine sheet, establishing clearly between the foreman and his immediate superior just how the job should be handled. Frequent reviews will keep the job content up-to-date, and apprise the foreman as to whether he is giving a satisfactory performance.

Baseball at M.I.T.

Highlight of the Conference dinner was the guest speaker, George "Birdie" Tebbetts, former catcher, and now manager of the Cincinnati club of the National Baseball League. Introduced by the chairman, Prof. Howard F. Taylor, M.I.T., Tebbetts displayed a racy wit and a keen sense of the finer points of both team management and the psychological handling of indi-

continued on page 113

Chapter News

Shown seated left to right at the October meeting of the Saginaw Valley Chapter in Frankenmuth are: Speaker James H. Smith, Central Foundry Div., General Motors Corp.; Chairman F. J. McDonald, Central Foundry Div., General Motors Corp.; Vice-Chairman Woodrow W. Holden, Eaton Mfg. Co., Foundry Div.; and National Director Edward C. Hoenicke, Eaton Mfg. Co., Foundry Div.

★ Still Climbing

Membership in the American Foundrymen's Society as of November 5, 1953, was 11,300. This is an increase of 173 new members over the previous month. With continued effort, it appears that our goal of 12,000 members by June of 1954 will be reached before June. The new 1953-54 Directory of Chapter Officers and Directors has been sent to all chapter officers and directors. There are some additional copies available for those who may want them. Two new company members have been added to the rolls during the past month. They are:

COMPANY MEMBERS

Miller Bros. Iron & Metal Co., Milwaukee; David H. Miller, Pres. (Wisconsin Chapter).

Modern Metals Foundry, Bay City, Mich.; Edward M. O'Brien, Mgr. (Saginaw Valley Chapter).

Oregon

NORMAN E. HALL
Electric Steel Foundry Co.

Following the regular October dinner meeting of the Oregon Chapter, approximately 70 members visited the plant of Electric Steel Foundry Co. Prior to departure for the field trip Chairman James T. Dorigan introduced Bill Barber of ESCO, who outlined the tour and then introduced R. W. (Bill) deWeese, assistant to the president and manager of ESCO's High Alloys Div., who welcomed the members on behalf of management. Mr. deWeese outlined the plant operations and described the main divisions of the company's production and sales program. As part of the Oregon State College field trip program in conjunction with the Oregon Chapter's educational committee, some 20 college students made the tour of ESCO with the Oregon Chapter Members.

Central Illinois

J. F. KAUZLARICH
Peoria Malleable Castings Co.

The regular monthly meeting of the Central Illinois Chapter was held at the American Legion Hall, Peoria, Ill., October 5. Charles Arps, Allis-Chalmers Mfg. Co., Milwaukee, spoke on *"Are We Selling America Short?"* The regular program was preceded by a color sound film *"Pressure Cast Match Plate"* presented by O. H. Hares, Scientific Cast Products Corp., Chicago. Al Martens, Pekin Foundry & Mfg. Co., Pekin, Ill. presided as technical chairman.

Mid-South

R. C. MORIN
International Harvester Co.

One of the largest gathering of members was present at the second meeting of the current year for the Mid-South Chapter. Non-ferrous metals, their segregation, selection, refining and proper use, were discussed by E. Mooney, Federated Metals. A question and answer session followed his talk. Technical chairman for the evening was Charles Gray, Layne Bowler Co.

Tennessee

W. F. HETZLER
Eureka Foundry Co.

The first meeting of the Tennessee Chapter held October 16, at the Hotel Patten, Chattanooga, Tenn., was attended by 85 members. Joseph S. Schumacher, Hill & Griffith Co. presented a talk on *"Fool Proof Sand."* W. P. Delaney, Eureka Foundry Co., chapter

Attending the Management Night meeting of the Wisconsin Chapter held in October are from left to right, P. J. Mundie, Ph.D., speaker of the evening; D. C. Zuege, Sivyer Steel Castings Co.; and Chapter President, A. F. Pfeiffer, Allis-Chalmers Mfg. Co. Photo by W. V. Napp, Delta Oil Products Co.

chairman, announced the following new members: E. C. Ortmeier, Jr., Ortmeier Machinery Co.; W. H. Ashmore, ABC Electric Co.; Mark L. Holt, Chattanooga Welding and Machine Co.; B. E. Fielden, Lookout Pattern Works; James Weaver, Lookout Pattern Works; W. R. Huff, Strickland Pattern Works; John E. Acuff, Strickland Pattern Works; W. L. Newman, Burkart Schier Chemical Co.; A. D. Stanley, U. S. Pipe & Fdy. Co.; Frank Anderson, Tennessee Products Co., and Harvey Jarnigan, Mills & Lupton Supply Co.

Mo-Kan

C. W. (Joe) Boettcher
Black, Sivalls & Bryson, Inc.

The October meeting of the Mo-Kan Chapter was held at the Fairfax Airport private dining room in Kansas City, Kan. Speaker for the evening was David Johnson, Archer-Daniels-Midland Co. His subject was *"The 'D' Process for Shell Molding."* At a meeting of the Board of Directors before the regular meeting, it was decided to hold the Mo-Kan annual Christmas party for members, their ladies and guests, December 4, in the Ballroom of the President Hotel, Kansas City, Missouri.

Northeastern Ohio

Two speakers were featured at the October meeting of the Northeastern Ohio Chapter held at the Tudor Arms Hotel, Cleveland. The speakers, heard by 250 members and guests, were Harry E. Gravlin, Dearborn Iron Foundry, Ford Motor Co., and Frank W. Story, chief of the Cleveland Police Department. Mr. Gravlin's topic was *"Sand, Metal or Men,"* and Chief Story discussed the organization and equipment of the Cleveland Police Department.

St. Louis District

J. R. Bodine, Jr.
Bodine Pattern and Foundry Co.

Over 100 members and guests attended the October meeting of the St. Louis District Chapter. Chapter Chairman, Webb L. Kammerer, Midvale Mining and Mfg. Co., introduced Hans J. Heine, Acting Technical Director, AFS; Herbert F. Scobie, Technical Editor, American Foundryman; and William N. Davis, Director, Safety, Hygiene and Air Pollution Program of AFS. Technical Chairman, A. L. Hunt, National Bearing Div., American Brake Shoe Co., National Director, AFS, introduced the guest speaker, James R. Allan, International Harvester Co., Chicago. Mr. Allan's subject was *"Guide Posts to Better Foundries."* A question and answer period followed his talk.

Saginaw Valley

Roy S. Dahmer
Eaton Mfg. Co., Fdy. Div.

Two hundred members and guests of the Saginaw Valley Chapter opened the 1953-54 season October 1, at Fischer's Hotel in Frankenmuth. Three honorary life members of the Society were introduced: William Mixer, foundry consultant, retired from Buick Div., General Motors Corp., Carl Joseph, and James Smith, both of Central Foundry Div., General Motors Corp.

Talking things over following the October meeting of the Western Michigan Chapter are from left to right, Past National Director Horace Deane, Campbell, Wyant & Cannon Fdy. Co.; Treasurer John Byron Powers, Campbell, Wyant & Cannon Fdy. Co.; Chairman Fred J. DeHudy, Centrifugal Foundry Co.; Guest Speaker James H. Smith, Central Foundry Div., General Motors Corp.; Director William J. Cannon, Jr., Nugent Sand Co.; Secretary George W. Bartlett, Neway Equipment Co.; Vice-Chairman John A. Van Haver, Sealed Power Corp. Back to camera, unidentified.

D. C. Zuege, Sivyer Steel Castings Co., left, examining a sand sample with O. J. Myers, Archer-Daniels-Midland Co., at the September meeting of the Wisconsin Chapter. Mr. Myers, chapter chairman of the Twin City Chapter, spoke on the D Process at the meeting.

E. C. Hoenicke, Foundry Div., Eaton Manufacturing Co., and National Director of AFS, explained the proposed amendments of the by-laws. James Smith presented excerpts from his Charles Edgar Hoyt lecture and a film showing *"Shell Molding and Foundry Better Methods."*

Central New York

Bruce R. Artz
Pangborn Corp.

The Central New York Chapter held its October meeting at the Mark Twain Hotel, Elmira, N. Y., with the Elmira foundrymen acting as hosts. There were 115 members present. Chairman John Feola, Crouse-Hinds Co., Syracuse, N. Y., conducted the meeting and Program Chairman, Joe Gibson, Sweets Foundry, Johnson City, N. Y., arranged an interesting program on refractories.

D. W. Wuerthele, A. P. Green Fire Brick Co., Mexico, Mo., was the guest speaker assisted by Ralph Denton, R. J. Denton Co., Syracuse, N. Y. Mr. Wuerthele gave a brief discussion of refractories pointing out that the refractory industry is the most basic industry in the world next to agricultural. A film was also shown entitled *"Master of Fire—Servant of Industry."*

Philadelphia

Charles R. Sweeny
Atlantic Steel Castings Co.

The founder, and first chairman, of the Philadelphia Chapter, William B. Coleman, Wm. B. Coleman and Co., Philadelphia, was honored at a testimonial dinner at the October meeting
continued on page 103

Colored Film Strip Used To Promote Foundry Careers

A COLOR film strip with sound, entitled "A Career In Metal," has been making educational history for Northwestern Pennsylvania Chapter of AFS.

Originally conceived as the result of a lecture given by Earl Strick, educational chairman for the Chapter, the film outlines the possibilities for the man trained in engineering, metallurgy, molding, melting, finishing, and the service phases of the foundry industry.

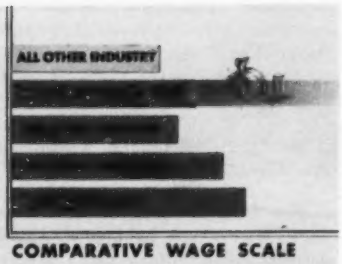
Cartoon-style presentation was used on film that can be projected with a 35-mm unit, and a 33-1/3 rpm record player.

The program is designed to inform young men about the more than 300 occupations within the industry. Cost, distribution, and production have been handled entirely by the Chapter.

The film strip has been purchased, to date, by chapters and individual companies for schools in the following cities: Syracuse, N. Y.; Saginaw, Mich.; Detroit; Chicago; South Bend, Ind.; Milwaukee; Toronto, Ont.; Indianapolis; and Erie, Pa.

Mr. Strick and members of the Chapter's educational committee hope to sell a copy of the strip to every local chapter for use in secondary and trade schools. Enthusiastic response has come from various parts of the country where the film has been shown, and since its original preview at the 1952 AFS Convention at Atlantic City.

Full information is available from Earl Strick, Erie Malleable Iron Co., Erie, Pa.



COMPARATIVE WAGE SCALE

Film strip consists of series of panels like those at right. (Top) Metallurgist is shown as chef of the foundry. (Center) Chart showing foundry crafts enjoying one of the highest wage scales in industry. (Bottom) Job satisfaction is a reward of the foundry craftsman.

Calendar of Future Meetings and Exhibits

December

2-4 . . American Institute of Mining and Metallurgical Engineers
Netherland Plaza Hotel, Cincinnati. Electric Furnace Steel Conference.

13-16 . . American Institute of Chemical Engineers
Hotel Jefferson, St. Louis. Annual meeting.

January 1954

22 . . Malleable Founders' Society
Hotel Cleveland, Cleveland. General meeting.

25-28 . . Plant Maintenance & Engineering Show
International Amphitheater, Chicago.

February

1-5 . . American Society for Testing Materials
Hotel Shoreham, Washington, D. C. Committee Week.

11-12 . . Wisconsin Regional Foundry Conference
Schroeder Hotel, Milwaukee.

18-19 . . Southeastern Regional Foundry Conference
Patten Hotel, Chattanooga, Tenn.

March

15-19 . . National Association Corrosion Engineers
Kansas City Municipal Auditorium. 10th Annual Conference.

16-17 . . Steel Founders' Society of America
Edgewater Beach Hotel, Chicago. Annual Meeting.

April

5-7 . . American Institute of Mining & Metallurgical Engineers
Palmer House, Chicago. National Open Hearth Conference.

8-9 . . Malleable Founders' Society
Pittsburgh, Pa. Market Development Conference.

26-30 . . American Society of Tool Engineers' Industrial Exposition
Convention Center, Philadelphia.

May

5-7 . . American Society of Training Directors
Schroeder Hotel, Milwaukee. Annual Conference.

8-14 . . A.F.S. Convention & Exhibit
Public Auditorium, Cleveland.

June

14-15 . . Malleable Founders' Society
Seigniory Club, Quebec, Canada. Annual Meeting.

14-18 . . American Society for Testing Materials
Hotels Sherman and Morrison, Chicago. Annual Meeting.

Another Job* that Couldn't Be Done . . .

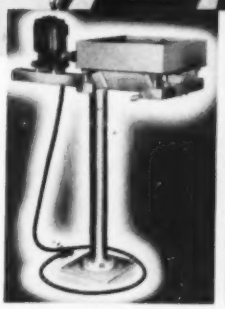
. . . without a ROLLER RIDDLE

The extremely deep thin fins of this core box for an air-cooled aluminum cylinder head are difficult to fill. It's a job that requires very thorough riddling and yet the riddle must be fast and easy to operate. In other words the job *requires a Beardsley & Piper Roller Riddle.*

The Roller Riddle is mounted on a sliding frame and is positioned over flask or core box for riddling. When the job is done, the riddle is slid back out of the way. An automatic switch starts and stops the riddling action.

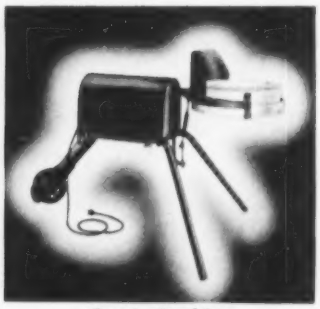
The Roller Riddle increases the productivity of molder or coremaker (up to 33%, users report) and also provides a higher degree of uniformity and improves surface quality of castings. You'll be pleasantly surprised at the Roller Riddle's low cost.

**Sand for this difficult coremaking job is mulled in a Model "40" Speedmullor. The box is rammed on a Beardsley & Piper J & J 612 RP Jolt Rollover Molding Machine.*



Roller Riddle for production molding and coremaking

Champion Suspension Riddle



Champion Stand Type Riddle

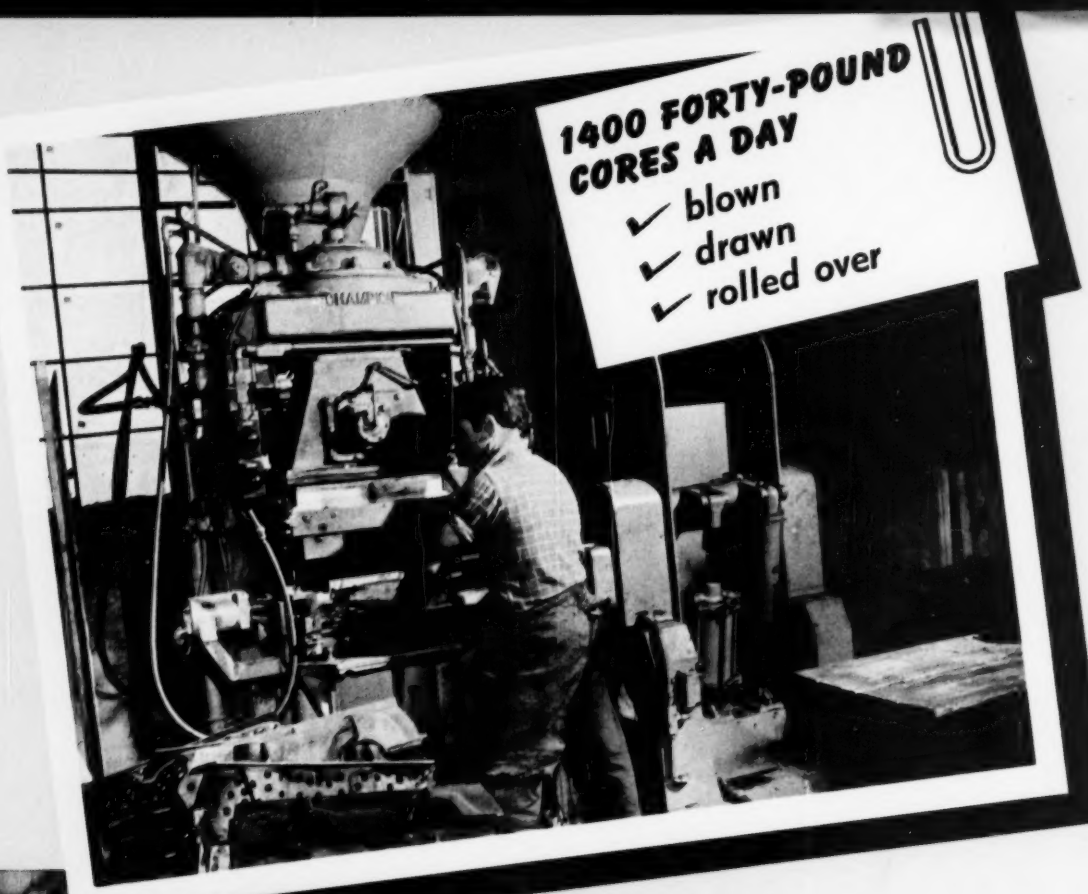
THE ROLLER RIDDLE IS ONE OF A COMPLETE LINE OF MECHANICAL FOUNDRY RIDDLES BY B. & P.

write today for complete information

BEARDSLEY AND PIPER

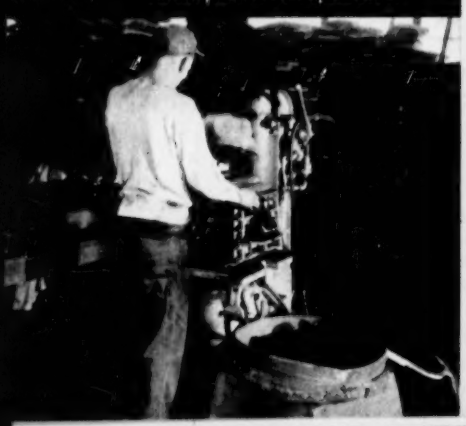
DIV. PETTIBONE MULLIKEN CORP.

2424 N. Cicero Avenue, Chicago 39, Ill.



Six Champion Core Blowers keep Newnam's core room running at top capacity.

A worker jolts a small mold on one of Newnam's twenty Champion Jolt Squeezers.



NEWNAM CHOOSES CHAMPION!

The Newnam Foundry Company of Kendallville, Indiana, had always been a *"Champion"* plant. Champion Core Blowers handle most of the foundry's coremaking jobs, and Champion Jolt Squeezers are the backbone of the foundry's molding department.

So satisfactory was the performance of these machines, that when a $500,000.00 fire destroyed the foundry, Newnam management chose Champion a second time in both the core room and the foundry. They were convinced by previous performance of Champion's superiority.

The latest installation at Newnam is a high production Champion Blo-Matic Rol-A-Cor Unit. 1400 forty-pound cores are automatically blown, drawn, and rolled over daily.

For your toughest core blowing jobs—choose Champion. You will find that these rugged Champion Blowers pay off in your core room, just as Champion Molding Machines pay off on your molding floors. Write today for specifications and prices. *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39, Illinois.*

News of Technical Committees

Steel Division

Research Committee. Chairman C. H. Wyman, Burnside Steel Foundry Co., Chicago, called this meeting to order on October 2 at Chicago's Congress Hotel.

After a review of an April 10 committee report dealing with the technical work being carried out by the seven cooperating foundries, Mr. Wyman briefly discussed current tests being conducted at Harrison Steel Castings Co., and Burnside Steel Foundry Co. These experiments involved pouring cup design.

The next part of the research program will include an attempted correlation between hot strength properties of sand, and hot tear lengths. Test cores will be sent to Harry W. Dietert Co., Detroit, for further investigation.

Temperature measurements were discussed at length, and it was agreed that electronic devices are superior to mechanical units because of greater speed.

H. J. Heine, Acting AFS Technical Director, reported on American Steel Foundries' donation for research at Armour Foundation. Committee members agreed that the money should be coordinated with current investigations, and several research projects were suggested.

Time Study & Methods

The Time Study & Methods Committee met on September 18 at the Congress Hotel, Chicago. M. T. Sell, Sterling Foundry Co., Wellington, Ohio, presided.

Mr. Sell was re-elected to serve as committee chairman for another year. A paper authored by M. E. Mundel on foundry industry union contracts has been reviewed by the committee and will be used as a preface to a labor survey by National Foundry Association.

The group discussed a proposal to change the name of the committee. It is the consensus of the majority that a title more commensurate with an industrial engineering approach would be more appropriate. It was decided to petition the AFS Board of Directors for permission to make the change.

The committee's publication: "Industrial Engineering Handbook for Foundry Operations" was reported ready for production, probably in the spring of 1954.

Chairmen were appointed for the division sessions at the Convention, and a tentative listing of papers was presented.

Pattern Division

Program & Papers Committee. This committee met under the chairmanship of J. W. Costello, American Hoist & Derrick Co., St. Paul. The meeting was held at AFS National Headquarters, Chicago, on September 30.

The Chairman reviewed developments since the committee last met on October 22, 1952. Next, plans were discussed for the Pattern Division's participation in the 1954 Convention at Cleveland.

The question of recorders was brought up, with reference to the reluctance of some speakers to talk freely when their remarks are being recorded.

Members agreed to explore the possibility of obtaining papers on high pressure molding, and the general future for patternmakers for the Convention. It was also suggested that a paper on pattern equipment for shell molding should also be on the program.

Considerable interest was manifested in the possibility of sponsoring a Pattern Division booth at the Convention, as was done in 1950. This proposal will be taken under further consideration.

H. J. Heine, AFS Acting Technical Director, expressed the desirability of a definite research project for the division, such as the development of foreign woods for use in pattern equipment. The proposal met a favorable response.

The committee members expressed a belief that pattern makers are not sufficiently represented in AFS and that projects of this type, and the preparation of a small manual for prospective members, would be helpful.

Malleable Division

Executive and Program & Papers Committees. These committees met jointly at Rackham Memorial, Detroit, on September 15. F. B. Rote, Albion Malleable Iron Co., Albion, Mich., served as chairman.

H. J. Heine reported for AFS headquarters on the 1954 Convention at Cleveland, listing the major dates and events.

Following discussion, the committee decided to schedule three technical sessions, one round table luncheon, and two shop course sessions. A tentative list of papers was announced. Chairmen and co-chairmen of the three sessions will be chosen as soon as the content of the papers to be presented is fully known, probably about January 1, 1954.

Further business included programs for the shop courses and the round table luncheon. Various members of the committees agreed to contact prospective authors for Convention papers.

Brass & Bronze Division

Executive Committee and Advisory Group. Chairman B. N. Ames, U. S. Naval Shipyard, Brooklyn, presided over this meeting at the Congress, Chicago.

Mr. Heine presented pertinent data on the 1954 Convention and the part to be taken by the Brass and Bronze Division. The Chairman then called on H. C. Ahl, Jr., Down River Casting Co., Rockwood, Mich., for a report on the Program and Papers Committee meeting, of which he is chairman.

Reports were also heard from chairmen of the research committee, and the committee on recommended practices for non-ferrous alloys.

Chairman Ames announced the formation of a Brass and Bronze Sand Properties Committee in the Sand Division. A request was made for names to be suggested for service on this committee.

Names were suggested for recommendation for the AFS awards at the Convention. Finally, it was proposed that a copper-base alloys foundry practice circular should be made available for distribution at the round table luncheon during the Convention.

Program & Papers and Research Committees. Chairman H. C. Ahl, Jr., conducted this meeting and listed the papers that have been promised for the Convention. The Brass and Bronze Division will schedule three technical sessions, with three papers per session. Two shop courses and a round table luncheon are also on the program.

It was decided that additional tests are necessary to determine the efficacy of the AFS fracture test. Considerable discussion followed in reference to a new research project for the division. The objective was tentatively set as an effort to find a simple post mortem fracture test to determine melt quality.

PROGRESS REPORT ON NATIONAL CARBON

TRADE-MARK

BLAST FURNACE LININGS

One out of every three blast furnaces in this country is now lined with "National" carbon. With this outstanding acceptance of carbon as a blast furnace refractory, let's take a look at its remarkable performance over the long haul.

Here are the facts:

- *23* "National" carbon-lined furnaces have each produced over *2* million tons.
- *5* of these have passed the *2 1/2* million ton mark.

These are all original linings — *and still going strong!*

Every year more "National" carbon goes in... more unit tonnages go up and costs come down... more operators learn what *smooth* operation really is.

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CARBON LININGS FOR FERRO-ALLOY FURNACES • CARBON MOLD PLUGS • GRAPHITE THERMOCOUPLE SHEATHS • GRAPHITE STARTERS FOR HOT-TOPPING • CARBON CINDER NOTCH PLUGS • GRAPHITE AND CARBON CORES • GRAPHITE RISER RODS • CARBON BOXES AND GRAPHITE POWDERS FOR HEAT TREATING • PIPE AND FITTINGS • CARBON BRICK • PUMPS • CONDUCTOR ROLLS • SPECTROSCOPIC ELECTRODES • STEAM JETS • ANODES

COLLECTS 17,400 LBS. OF DUST PER DAY!

3-SHIFT OPERATION!

4 TO 8 YEARS CONTINUOUS SERVICE!

MINIMUM PARTS REPLACEMENT!

—That's ROTO-CLONE Dust-Control!

16 Units, after 4 to 8 years of 3-shift, heavy-duty service, continue to rack up records for efficiency and economy

Collecting 17,400 lbs. of dust per 24-hour day, every day! That's the schedule 16 ROTO-CLONES have maintained at Maynard Electric Steel Castings, Milwaukee, Wis., since their installation between 1944 and 1948.

It's a big dust load and a tough dust load. ROTO-CLONE assignments in foundry and cleaning room involve collecting the following: metallic fumes from electric furnaces; fine sand particles from shakeouts and sand systems; heavy abrasive loads from sand blasters and tumblers; and metal and grinding wheel dust from swing frame, portable and stand grinders.

What about parts replacement due to such gruelling service? This is the payoff! **Out of 16 ROTO-CLONES, representing all units in the line, 13 have had no parts replacement except for sludge ejector sprockets and chains.**

That's the ROTO-CLONE story at Maynard. It can be repeated in your plant on any dust-control job you select—the tougher the better. A call to your nearby AAF representative will get immediate action.

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AAF

American Air Filter COMPANY, INC.

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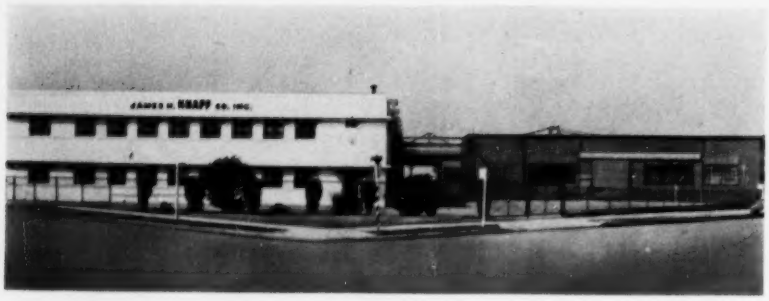

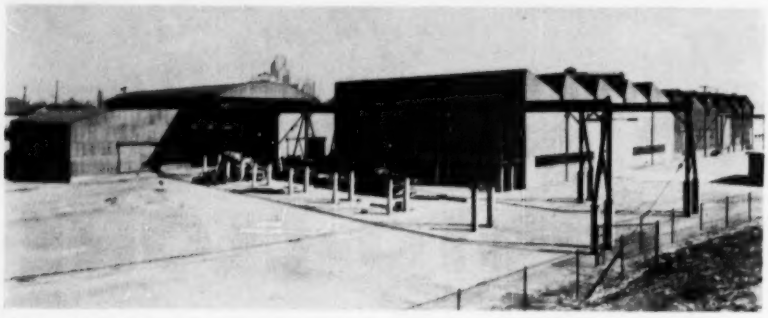

James H. Knapp Company's new plant in Los Angeles, Cal., covers three and a half acres. Above, the general offices and engineering building, and shop No. 1. Below, Shops No. 2 and 3, with fabrication yards in the foreground.

Foundry Tradenews

Vanton Pump Corp., has changed its name to **Vanton Pump & Equipment Corp.** The new name was decided upon in view of Vanton's addition of corrosion resistant plastic and hard rubber valves, pipe and fittings to its regular line. It has also been announced that the Vanton manufacturing plant has been moved from its present location in Long Island City, N. Y., to a new building on the premises of its affiliate company, The Cooper Alloy Foundry Co., Hillside, N. J. Executive and sales offices will remain at the Empire State Building, New York.

Certified Alloys Co., Bedford, Ohio, producer of Ameak zinc die casting alloys is opening a new and modern alloying plant in the Los Angeles industrial area. The new plant, located at 9323 Bermudez St., Rivera, Calif., will house the company's production, research, sales and administrative departments. It is equipped with modern production facilities. Quality will be controlled and checked by modern testing equipment to assure that each ingot meets metallurgical specifications.

Construction of a 19,000 sq ft fireproof steel building, which will replace one recently razed by fire is scheduled to start soon at the gray iron foundry of the **Lindgren Foundry Co.,** 717 Main St., Batavia, Ill. A contract to produce the new structure, which will be used for pattern making and storage, has been awarded to the Luria Engineering Co., Bethlehem, Pa. The new structure will enable the Lindgren Co., to increase its pattern storage capacity by 50 per cent. The building is to be a single-story structure, 20 ft high to the eaves and will measure 140 x 140 feet. The previous storage building was destroyed in a fire last July.

C. B. Hunt & Son, Inc., Salem, Ohio, manufacturers of Quick-As-Wink air and hydraulic control valves, has announced the appointment of Alfred Halliday, with offices at 317 Starks Bldg., Louisville, Ky.; 1509 Madison Ave., Memphis, Tenn.; and 916½ Henley Ave., Knoxville, Tenn.; as sales representative. He will represent the firm in Kentucky, Central and Western Tennessee, Northern Mississippi and Arkansas.

Hewitt-Robins, Inc., Stamford, Conn., has concluded an agreement with Coleman-Wallwork, Ltd., London, under which Coleman Wallwork will manufacture, to Hewitt-Robins' specifications, vibrating equipment for railroad cars. Coleman-Wallwork will have distribution rights in the British Isles, North Ireland, South Africa, India, Australia and New Zealand. The agreement between Hewitt-Robins and Fraser and Chalmers Engineering Works of General Electric, Ltd., Erith, Kent, England, will continue.

Dayton Oil Co., Dayton, Ohio, has opened an eastern office in the Graybar Building, New York City. Dan D. Downes has been appointed branch manager of the new office. He will be in charge of sales for the chemical specialties.

A group, devoted exclusively to applied mathematics, known as **Mathematical Computing Service,** Bayside, N. Y. has been organized. The firm specializes in performing services for industries desiring engineering calculations, charts and monographs of a high degree of complexity and the treatment of related mathematical problems in the field of metallurgical engineering.

Milton A. Meier Co., New Center Building, Detroit, has been appointed by **Benj. Harris & Co.,** Chicago Heights, Ill., as their district sales representative for the sale of brass and bronze ingot. The area will be served by direct shipment from the Chicago Heights plant and from warehouse stocks in Detroit and Grand Rapids, Mich.

James H. Knapp Co. has moved into its new plant at 1731 Workman Street, Los Angeles, Cal. Some 151,000 sq ft of the new location will be used immediately in the expansion of the company. Four modern concrete and steel buildings, housing the shops, and engineering and administrative offices, cover approximately half the space, with the remainder used for paved, steel-fenced fabrication yards.

Mackintosh-Hemphill Co., Pittsburgh, Pa., celebrates its 150th birthday this year. The firm traces its history back to the founding of the Pittsburgh Foundry in 1803. The company is a veteran western Pennsylvania industry with plants in Pittsburgh and Midland, Pa. Early days saw cannon and shot made for Perry's battle on Lake Erie. Ordnance has been made for every war since that of 1812. Predecessor company made first rolls for aluminum rolling. The first locomotive built west of the Alleghenies was made here.

Our 71st Yuletide Message to Our Friends of the Foundry Industry

Please accept these Holiday Wishes for health, happiness and prosperity . . . and add to them a sincere "Thank You" from all of us at Stevens.

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EVERYTHING FOR A FOUNDRY

BRANCHES: BUFFALO • CLEVELAND • INDIANAPOLIS • NEW HAVEN • DAYTON
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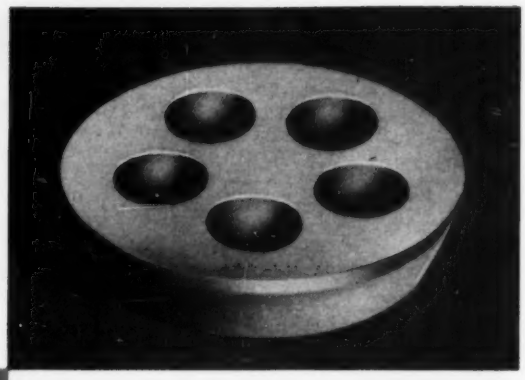
AlSiMag® Ceramic STRAINER CORES

Specially Developed by Ceramic Experts to



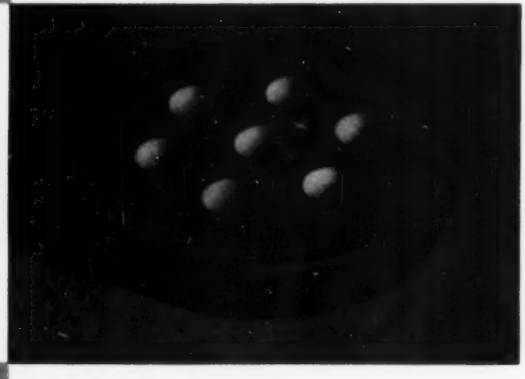
ELIMINATE HANDLING BREAKAGE —WITHSTAND MOISTURE —RESIST HEAT SHOCK

AlSiMag 564 (White)

An economical material which easily withstands pouring temperatures of iron, aluminum, bronze, brass, and similar metals.

Now your foundry can forget shop-made sand core problems—breaking, crumbling, slowed-down production, sand washed into castings, and all the rest! AlSiMag Ceramic Strainer Cores are made of special compositions developed after years of research. They will not break in handling, will not erode at any normal pouring temperatures, substantially speed production, make big savings right down the line! Don't let obsolete sand cores rob your foundry—order . . .

AlSiMag CERAMIC STRAINER CORES



COST LESS PER CORE!

As a result of our extensive high speed production facilities and years of specialized experience, AlSiMag Ceramic Strainer Cores actually cost less in most instances than shop-made sand cores!

AlSiMag 202 (Tan)

Special heat shock resistance. Excellent for all metals with exceptionally high pouring temperatures.

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Try AlSiMag Strainer Cores—let your own experience tell the story. Test samples of standard sizes free on request. 14 standard sizes—write for free Bulletin 532. Samples made to your specifications at moderate cost.

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A SUBSIDIARY OF MINNESOTA MINING AND MANUFACTURING CO.

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BAKELITE SHELL MOLDING RESIN BR-12011S OFFERS THESE EXTRA FEATURES:

- **Faster production of molds**
- **Reduced tendency of resin-sand mixture to fall off pattern plate**
- **Reduced tendency of molds to distort on ejection from pattern plate**
- **Smaller quantities of resin needed to reach minimum usable strength**

GET THE STORY FROM THIS BULLETIN . . . Bakelite Shell Molding Resin BR-12011S has been specially developed to give greater latitude in mold-making. It can be subjected to a greater variation in operating conditions than ordinary shell molding resins. Molds made with BR-12011S reach minimum usable strength faster, retain strength longer at curing temperatures, permit more leeway in curing time.

Shell molds made with this resin resist the tendency to distort upon ejection from the hot pattern plate, insuring better mating of mold halves. The molds also offer greater resistance to deformation during the pouring operation, resulting in castings that are more dimensionally accurate.

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■ **A325.."Use and Abuse of Crucibles," R. H. Stone, *American Foundryman*, vol. 24, no. 3, September 1953, pp. 57-61.**

Care and proper application of crucibles in all types of furnaces are covered. Furnace maintenance, and proper support of crucibles in the furnace and in lifting and carrying tongs, fuel regulation, and proper use of flux are all factors in decreasing the cost of crucibles per 100 lb of metal melted.

■ **A326.."Use of Diamonds as Mold Inserts," *American Foundryman*, vol. 24, no. 3, September 1953, pp. 62-63.**

Diamond drill bits for mining operations are made by positioning industrial diamonds in a die plate, then casting them in place with beryllium copper. Bits are heat treated by quenching and age-hardening.

■ **A327.."Air Pollution and Public Relations," John M. Kane, *American Foundryman*, vol. 24, no. 3, September 1953, pp. 64-65.**

The foundry industry can solve some of its air pollution problems through proper emission control equipment, some through public relations. About 10 per cent of all capital expenditures for foundry equipment has been allocated to air pollution control equipment. Development and improvement of high efficiency dust collector designs have been largely due to forward-looking foundrymen and foundry equipment suppliers.

■ **A328.."What is a Good Pattern," Walter Siebert, *Foundry*, vol. 81, no. 9, September 1953, pp. 132-133.**

Foundation for good patternmaking is consultation with the designer and a visit to the foundry where castings will be made. Principles of good construction of large patterns are given.

■ **A329.."Stress Relief of Gray Iron," C. O. Burgess, *Foundry*, vol. 81, no. 8, August 1953, pp. 112-114, and vol. 81, no. 9, September 1953, pp. 128-131, 302-304.**

Review of the causes and ill effects of internal stresses in gray iron castings and methods of heat treating to eliminate stresses in various classes of castings.

■ **A330.."Ultrasonic Testing of Castings," Thomas A. Dickinson, *Foundry*, vol. 81, no. 9, September 1953, pp. 221, 222, 224, 226.**

Design characteristics of castings not porosity that might possibly be present have held back more wide-spread use of ultrasonic testing. Immersion-scanning technique has simplified application and is being used in aircraft casting testing.

■ **A331.."Copper Oxides—Useful Tools in Casting Copper-Base Alloys," L. G. Klinker, *Foundry*, vol. 81, no. 9, September 1953, pp. 228, 230, 236.**

Six methods of supplying oxygen to maintain oxidizing conditions during melting of copper-base alloys are evaluated. Object of all is to prevent hydrogen pickup which is believed to be a major cause of casting unsoundness.

■ **A332 . . "Evaluating Molding Methods," *American Foundryman*, vol. 24, no. 3, September 1953, pp. 48-52, and vol. 24, no. 4, October 1953, pp. 42-46.**

This two-part symposium on molding methods consists of six papers: "What is Precision Casting?" Hiram Brown; "Green Sand is Versatile," C. E. Maddick; "Dry Sand for Heavy Work," George W. Ansleman; "The Place of Shell Molding," J. B. Stazinski; "Molding in Core Sand," George P. Antonic; and "Casting in Metal Molds," W. B. Scott.

In Part 1, Brown reviews the meaning of the term *precision*, suggests that designers consider factors other than precision and not ask for precision for it's sake alone, and indicates that the term *precision casting* should not be used unless accompanied by the name of the casting process.

Maddick shows that green sand molding provides versatility, economy, and high production. Use of routing card on which all details of the molding operation for a pattern can be recorded eliminates guess-work on jobs not in continuous production.

Ansleman explains that dry sand is used particularly on large castings to achieve high dry and hot strength which prevents washing and enables mold to withstand high metal pressures. Dry sand molds are essential where complicated coring requires fitting.

In Part 2, Stazinski outlines experience in producing stainless steel, alloy steel, carbon steel, and gray iron castings in shells. A number formerly were forged. He outlines both advantages and disadvantages and advises considering shell molding where the following conditions exist: (1) Possibility of eliminating some machining operations; (2) Need for thinner sections, small cored holes, sharp contours, minimum draft, or intricate pockets in the casting design; (3) Weight reduction; (4) Need for surface appearance better than you can obtain in conventional sand practice.

Casting design dictates the use of core sand molds, Antonic writes, pointing out that they are particularly appropriate for complex, thin-section castings or castings in which finish, trueness to pattern, and dimensional accuracy are required. Use of risers is greatly reduced or eliminated because mold wall stability is greater. Greater flexibility in gating and risering is possible in cores and molds made of cores can be turned into any position for pouring.

Die and mold materials limit the alloys that can be cast in metal molds and govern die life, according to Scott. Tolerances held and surface finish are functions of mold design and maintenance. In all cases of permanent mold or die castings, the best qualities are present in the surface sections.

■ **A333 . . "Side-Blow Converter Refractories," Ralph A. Clark, *American Foundryman*, vol. 24, no. 4, October 1953, pp. 34-39.**

Taken from a forthcoming AFS publication on foundry refractories, the article describes the severe thermal and mechanical service convertor refractories must stand. Complete procedures for use of brick and for monolithic linings are given and the refractory practice of five convertor users is detailed.

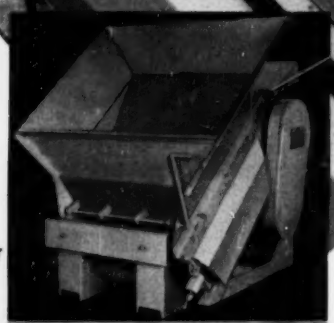
■ **A334.."Foundry Safety Practices," *American Foundryman*, vol. 24, No. 4, October 1953, pp. 54-60.**

Medical phase of worker protection calls for: (1) Pre-placement physical examination and chest x-ray; (2) Annual physical examination and chest x-ray; (3) Adequate first aid facilities in case of injury or illness. A number of foundry materials and metals are covered in detail as to the principal dangers they create, maximum allowable concentrations in air, and control methods.

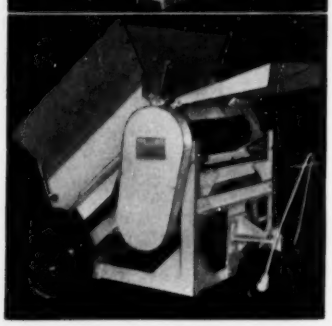
HALF A TON AT ONE "GULP"!

This "hungry" machine, fed half a ton of sand at a load, gives proper aeration to molding sand prepared in sand conditioning systems.

Sand delivered from a muller to molding stations by means of front end loaders is usually rammed tight in the loading process. The large capacity (120 to 180 tons per hour) Model "NY" Royer will handle the entire load from a 12 cubic foot bucket without spillage—giving it complete blending, mixing and aeration—discharging a light, open sand direct to the molder.



STATIONARY MODEL NYS-E



PORTABLE MODEL NYP-E

Unusually heavy welded construction assures long service life under most abusive operating conditions. Both models can be moved to desired locations; the NYP-E on its sturdy four-wheeled carriage; model NYS-E by fork lift.

Be sure you retain the benefits of centralized sand control by delivering aerated sand to your molding stations. Write for full information on the complete Royer line of sand conditioners.

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Foremost in Sand ROYER *Conditioning Equipment*

ROYER FOUNDRY & MACHINE CO. 155 PRINGLE ST. KINGSTON, PA.

Chapter News

continued from page 89

of the Philadelphia Chapter at the Engineers Club, Philadelphia. Since the time he was chairman, he has been secretary-treasurer of the chapter. The establishment of a yearly scholarship, to be known as the William B. Coleman Award, was announced at the meeting.

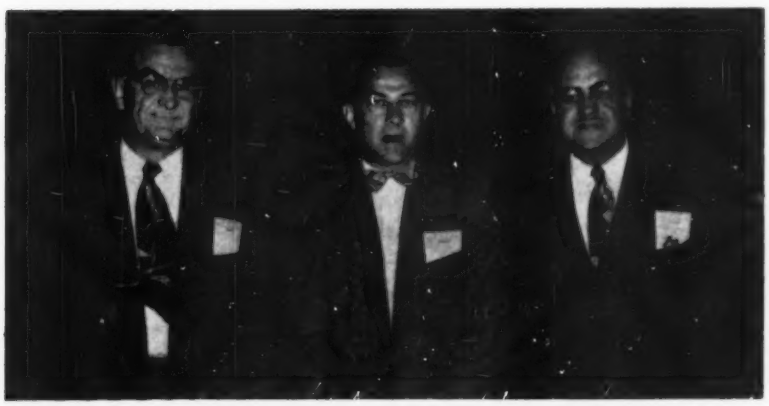
After dinner the group was divided into three sections, Gray Iron, Brass and Bronze and Steel. Each group had its own speaker and discussion period. The main topic of each was "Melting Practice." Lewis H. Gross conducted the Gray Iron Session and Henry Winte was technical chairman. The Brass and Bronze Session was conducted by Harry Ahl and technical chairman was Daniel E. Best. John Juppenlatz conducted the Steel Session and Edward H. Berry was technical chairman.

The chapter's annual outing and picnic, held at the Manufacturers Golf and Country Club in July, was attended by 500 members and guests.

Wisconsin

WALTER R. MATSCHULAT
Milwaukee Bronze Casting Co.

Paul J. Mundie, Ph. D., consultant, was the guest speaker at the general meeting on the Wisconsin Chapter, held October 9 at the Hotel Schroeder, Milwaukee. The topic of his address was *"Personal Factors in Supervisory Success."* He pointed out that the true foundry man, such as a skilled molder, is getting to be a thing of the past due to the reluctance of the high school graduate to enter the foundry field.



E. N. Carpenter, Carpenter Bros., left, R. J. Stevenson, Whitewater Mfg. Co., center, and C. E. Westover, Westover Engineers, right, shown at the speakers table at the October meeting of the Wisconsin Chapter.

A group of past-presidents attending the September meeting of the Twin-City Chapter are from left to right, F. A. Austin, Crown Iron Works; S. L. Cameron, Jr., Valley Iron Works; C. Fred Quest, J. F. Quest Foundry; J. W. Costello, American Hoist & Derrick Co., and O. Jay Myers, Archer-Daniels-Midland Co., present chairman.

Another point Mr. Mundie made was that many managers are just good business men and do not know too much about the technical end of the foundry. Several hundred members were present to hear his address.

Twin-City

R. J. MULLIGAN
Archer-Daniels-Midland Co.

The annual joint AFS-A.S.M. meeting this year was hosted by the Twin-City Chapter. Guest speaker, Dr. J. C. McDonald, Dow Chemical Co., spoke on *"Designs for Magnesium."* He stressed the relative rigidity of magnesium compared to the other common structural metals, such as aluminum and steel, on a weight basis. This superiority of magnesium to aluminum and steel means higher rigidity for a given amount of weight, permitting the designer freedom from many weight restrictions, he pointed out. Dr. McDonald recommended the value of a simple design for the benefit of better fatigue resistance. Dr. Mackay, assistant professor, Department of Metallurgy, University of Minnesota, and chairman of the local A.S.M. Chapter, directed a question and discussion period following Dr. McDonald's talk.

Eastern Canada

W. J. BROWN
Robert W. Bartram, Ltd.

The third Maritimes meeting sponsored by the Eastern Canada Chapter, was held at the Admiral Beatty Hotel, Saint John, N. B., in September. T. McAvity & Sons, Ltd., were hosts to the visitors and George McAvity acted as chairman of the meeting. A large gathering visited the McAvity plant on the afternoon of the first day and great interest was shown in the modernized equipment recently installed in the brass and iron foundries. The technical session and open forum in the evening was preceeded by the showing of the Beardsley & Piper film *"Mechanization of Core Making."* This was followed by two papers: *"Practical Methods of Casting High Strength and Pressure Tight Aluminum Castings"* by George McAvity; and *"A Review of Molding Methods in Iron and Steel Foundries in Europe"* by James Grieve, Dominion Engineering Works, Ltd. Speakers and subjects presented at the Technical Sessions the second day were: Wm. C. H. Dunn, Western Pattern Works, Inc., *"The Use of Plastics in Pattern Equipment"*; Clarence R. Dutton, Crane, Ltd., *"Production of Metal Patterns by "C" Shell-Mold Process"*; and John Hodgkiss, Canadian Car & Foundry Co., Ltd., *"The Use of Rubber in Pattern Equipment."*

continued on page 104

Enjoying dinner at the Management Meeting of the Wisconsin Chapter are from left to right, J. Brodisse, A. Hackharth, E. Grundman, P. Bulthris and B. Zinn of Waukesha Foundry and S. Hoppe of Badger Firebrick & Supply Co.

Chapter News

continued from page 103

Tri-State Chapter

EDWARD W. O'BRIEN
Oklahoma Steel Castings Co.

Fifty-eight members and guests of the Tri-State Chapter attended the October meeting at Wilder's Buffet, Joplin, Mo. T. E. Barlow, Eastern Clay Products, Dept. International Minerals and Chemical Corp., Chicago, as guest speaker, talked on High Pressure Molding. Mr. Barlow pointed out that, although high pressure molding is still in its infancy, and changes are rapidly being made from day to day, at this time it is their contention that the majority of all close tolerances can be maintained through working pressures of 100 psi to 600 psi. J. E. Geckler, Missouri Steel Castings Co., Joplin, acted as program chairman in the absence of P. V. Spooner, who was ill.

Chesapeake

HENRY M. WHITMYER, JR.
Foundry Service & Supply Co.

The Chesapeake Chapter held its third annual Casting Improvement Seminar and regular monthly meeting October 23 and 24. The meeting was opened by a report to the members by W. H. Baer, chapter chairman, on the National Directors Meeting in Chicago. A. A. Hochrein reported on the crab feast and boat ride held by the chapter last July and announced the annual Oyster roast to be held in January.

Presentation of a Foundry Library was made to the Mergenthaler Technical High School, Cast Metals Div. Lewis Gross made presentation on behalf of the chapter to W. J. Hucksull representing the Board of Education.

At the Technical session, *"What the Sand Producers of Today Are Doing to Supply Better Sands for the Castings the Foundry Will Produce Tomorrow"* was presented by the technical staff of the New Jersey Silica Sand Co. S. A. Wick, gave a talk on the development of the geological sand formations in the southern New Jersey area, followed by a movie on the mining and processing of sand for industry. C. W. Thompson served as narrator. D. J. Jones gave a lecture on foundry sands.

The session on Saturday covered, *"How the Proper Use of Burning and Welding Will Make Your Castings More Saleable"* by W. E. Condon, Linde Air Products Co.; *"Friction Sawing"* movie by Baltimore Do-All Machine Co.; *"The Proper Selection of Grinding Wheels Will Make Your Castings More Saleable"* by M. E. Hawkins, Atlantic Abrasive Corp.

Southern California

OTTO H. ROSENTRETER
National Engineering Co.

The October meeting of the Southern California Chapter was held at the Rodger Young Auditorium October 9, and was attended by approximately 160 members and their guests. The subject of the meeting was "An Open Discussion on Problem Castings." Henry W. Bowers, Rich Manufacturing Co., Frank C. Warga, AiResearch Manufacturing Co., Anthony Tuzzolino, Overton Foundry, William C. Baud, Mechanical Foundries Div. Food Machinery and Chemical Corp. were the four speakers of the meeting. Ferrous and non-ferrous castings, and the difficulties they presented, were discussed by the panel members, and also, solutions for some of the problems encountered in casting were offered by foundrymen from the floor.

Texas

EDWARD W. PRUSKE
Alamo Iron Works

The October meeting of the Texas Chapter, San Antonio Section, was attended by 64 members and guests. A. L. Pace, General Electric Co., Milwaukee, showed and discussed slides entitled *"More and Better Castings at Less Cost with X-Ray."*

Rochester

HERBERT G. STELLWAGEN
Hetzler Foundries, Inc.

Two new members were announced by Edward Baker, membership chairman of the Rochester Chapter, at the chapter's first meeting held October 6, at the Seneca Hotel. *"Mechanization in the Small Foundry,"* was the topic of R. L. McIlvaine, National Engineering Co., Chicago, guest speaker for the evening. The amount of mechanization and its proper functioning will be the means of high production or just what may be satisfactory production, Mr. McIlvaine asserted.

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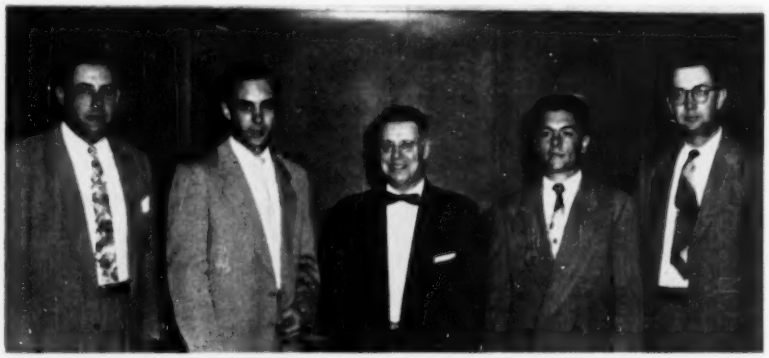

Shown attending the September joint meeting of the student chapters of AFS and the A.S.M. at the Missouri School of Mines from left to right are: Dr. D. S. Eppelsheimer, AFS Faculty Advisor; Ralph Hollocher, chapter chairman; Dean Curtis L. Wilson; Tony Salvaggi, A.S.M. chairman; and Dr. Schlechten, A.S.M. faculty advisor and chairman of the metallurgical engineering department.

BUCKEYE CONTINUES TO DEVELOP AND IMPROVE CORE OILS AND FOUNDRY SUPPLIES

Photo taken in Core Room Dept., The Wm. Powell Co., showing baking oven and finished cores. In manufacturing its world famous valves, Powell uses Linseal Core Oils exclusively.

New, Improved
BUCKEYE & LINSEAL
CORE OIL

Formulations continue to meet and solve today's core problems, in step with the ever changing foundry needs.

New, Improved
ECONOCORE
LIQUID CORE COMPOUND

Offers a substantial saving when used as a partial substitute for core oil.

Perfected by the same company which recently scored an outstanding success with *SLINGER-SLICK* . . . improved Parlex Base Liquid Parting . . . Avon (white) Non Silica Parting and many other foundry supplies. New *LINSEAL "2400 Series"* Faster Drying Core Oils can save you money 3 ways . . . 1. No additives needed to hasten drying time because our "2400 Series" Core Oils are compounded especially to dry faster . . . 2. Where crowded core conditions are present, "Series 2400" will get your cores through the ovens faster and increase your production without increasing production space . . . 3. Because these core oils withstand over-baked conditions both large and small cores can be baked in the same oven during the same baking cycle . . . *Challenge us, on your company letterhead, to prove these facts—through a discussion with one of our technical sales engineers for a FREE Test Run. Write today to address below.*

Manufacturers also of Parlex and Avon Partings . . . Linseal and Buckeye Core Oils . . . Buckeye High Temperature Furnace Cement . . . Stick Fast Core Paste . . . Linco Core Compound . . . Buckeye Patented Flask Guides and Specialty Foundry Products.

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FOR A *Quick* SURFACE-METAL SET . . .

DELTA Z-KOAT and Z-Z-KOAT

CORE AND MOLD WASHES

Contain ZIRCONIUM

DELTA Z-KOAT and Z-Z-KOAT Washes are easy to mix and easier to apply. After mixing, there is no danger of precipitation and, when dry, are completely moisture-proof. Applied by swabbing, dipping or brushing they adhere uniformly to the sand and produce smooth, highly-refractory surfaces.

Both DELTA Z-KOAT and Z-Z-KOAT Washes have unusually high fusion points and, because of their high heat conductivity, provide a more rapid surface-metal set. Both washes are economical to use.

DELTA Z-KOAT contains zirconium plus other high fusion refractories and

DELTA Z-Z-KOAT is an all-zirconium type wash.

Working samples together with instructions available on request.

DELTA OIL PRODUCTS CO.

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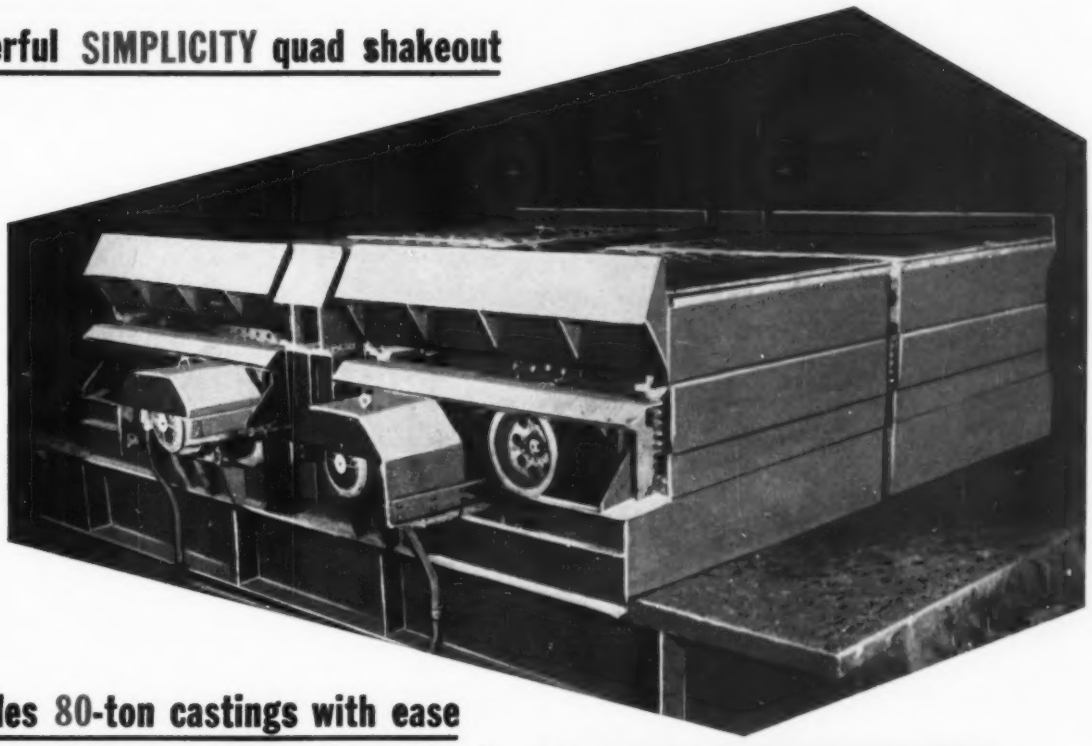
MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

Powerful SIMPLICITY quad shakeout



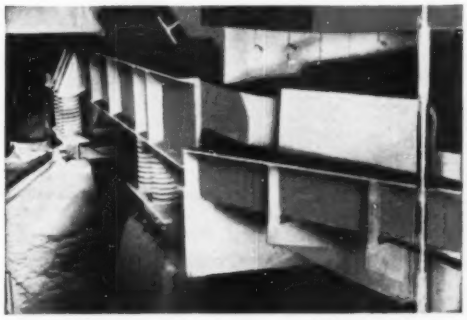
handles 80-ton castings with ease

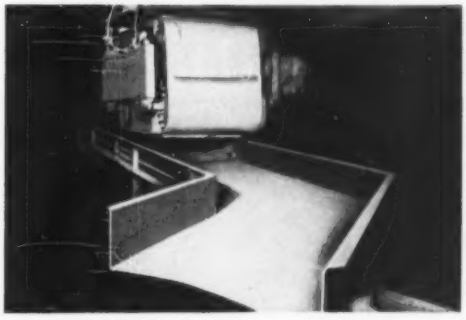
This is the Simplicity spring-mounted quad shakeout, made up of four 7' x 8' steel-decked Simplicity Model OM units, that is handling huge 80-ton tank hull castings for a well-known foundry.

After plenty of pounding by the big 80-ton castings, the deck of the Simplicity unit is still in sound condition. Controlled vertical vibration, concentrated at the deck, eliminates travel of flasks and castings and does a more thorough shakeout job in less time.

In the same foundry, a 4' x 20' Model OA Simplicity Feeder, installed under a hopper beneath the shakeout, feeds sand to the return conveyor for reclaiming without hang-up or bridging in the hopper.

This 3' x 20' Simplicity Model VS Conveyor, connected to the Simplicity Feeder, insures the smooth, even flow of sand back to the reclaiming unit. It is equipped with a Dings self-cleaning magnetic separator that removes all metal particles from the sand.





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Sales representatives in all parts of the U.S.A.
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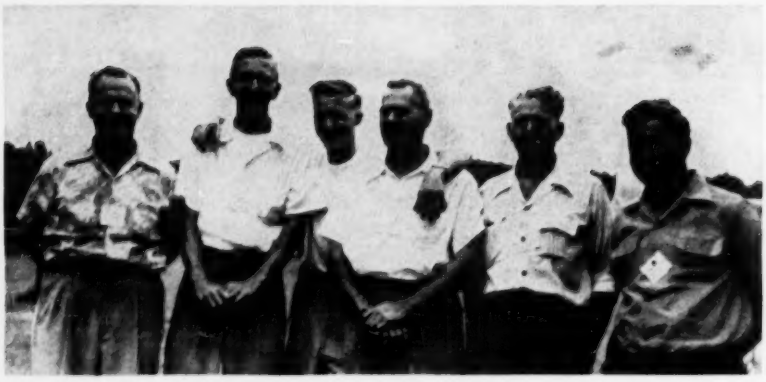

National Motor Castings Div. group of Campbell, Wyant and Cannon Foundry, South Haven, Mich., shown at the Western Michigan Chapter picnic.

Chapter News

continued from page 104

Western Michigan

WILSON W. HICKS
Sealed Power Corp.

The Western Michigan Chapter held its October meeting at Bill Stern's Restaurant, Muskegon Heights, Mich. The program for the evening was highlighted with a lecture by James H. Smith, Central Foundry Div., General Motors Corp. His talk and accompanying film on *"Outstanding Opportunities for the Foundry Industry"* was enjoyed by approximately 150 members. This started the new season's activities under the direction of the new officers, F. J. DeHudy, Centrifugal Foundry Co., Muskegon, Mich., chairman; and John A. Van Haver, Sealed Power Corp., Muskegon Heights, Mich., vice-chairman. Horace Deane, Campbell, Wyant and Cannon Foundry Co., Muskegon, Mich., Past National Director of AFS, acted as technical chairman for the evening.

Chicago Chapter

Three group meetings highlighted the November meeting of the Chicago Chapter. Speakers were Earl E. Woodliff, Detroit; Stanley Wilcox, White Pine Lumber Co., Chicago; A. Lesley Gardner, Pangborn Corp., Hagerstown, Md.; and Robert M. Rich, American Wheelabrator & Equipment Co. John A. Rassenfoss, American Steel Foundries, president of the Chicago Chapter, presided at the dinner meeting.

Mr. Woodliff spoke on *"Core Sand Mixtures"* before the combined malleable, gray iron, and non-ferrous groups. K. P. Smith, Chicago Malleable Castings Co., was session chairman.

Core sand with excessive refractoriness may cause hot tears the speaker said. A high-density core, achieved with a 5 or 6-screen sand is generally preferable. Unbaked oil is a source of core gas, Woodliff stated, pointing out that cereal is an even greater gas producer and should be kept below 1¼ per cent. For higher green strength, beyond the 1¼ per cent cereal limit he advised using 0.2 per cent western bentonite. He recommended the jolt

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Members and guests relaxing at the Annual Picnic of the Tennessee Chapter.

Obituaries

Doctor Eugene Piwowarsky died of a stroke October 17 in Aachen, Germany. He occupied the chair instituted at the technical school of Aachen for the advancement of metallurgical education. At his instigation and under his supervision the metallurgical laboratories of the school were brought up to a high standard of efficiency. Dr. Piwowarsky was to furnish the official exchange paper to AFS from the Institute of German Foundrymen for 1954.

James C. Nevenhoven, Sr., 42, superintendent of core room and shell molding at the Brillion Iron Works, Inc., Brillion, Wis., died suddenly of a heart attack at St. Vincent's Hospital, Green Bay, Wis., October 26. He was associated with the foundry trade for 24 years, having served an apprenticeship in molding at Freeport, Ill. He was with Caterpillar Tractor Co., Peoria, Ill., for eight years and at Stover Manufacturing, Freeport, Ill., before coming to Brillion, Wis.

George H. Lind, vice-president in charge of the foundry at the Brost Pattern & Casting Co., Cleveland, died recently. He was with the company for 17 years.

Albert P. Short, 60, district representative for The Chas. Taylor Sons Co., a subsidiary of National Lead Co., Cincinnati, Ohio, died September 22. Mr. Short represented the Taylor firm from 1931 until the time of his death.

Fred Dick, foundry superintendent of the Union Brass and Metal Co., St. Paul, Minn., died November 2.

George F. Applegate, secretary and sales manager of Ajax Electrothermic Corp., Trenton, N. J., died September 27.

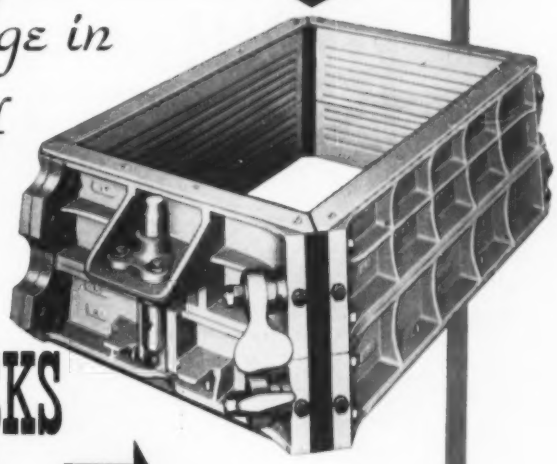
October Activity

Recording 31 new members during October, Birmingham Chapter headed the list, closely followed by Saginaw Valley's total of 28.

Other high totals for AFS Chapters were: Northeastern Ohio, 14; and Central Illinois, 13. Two new company members and five new international members were also added to the roster.

No Sand Can Lodge in Open Corners of

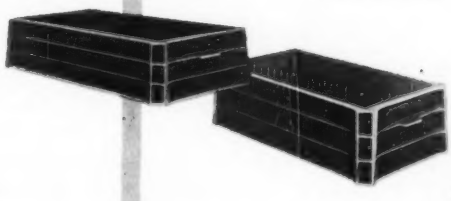
FREMONT SPREADLOCK FLASKS



—the corner gaps are completely closed by long-life, easily replaceable, live rubber corner inserts.

That's just one of the many reasons for the popularity of this new flask. Made of magnesium, which has twice the tensile strength of aluminum, they afford much longer service. Furthermore, magnesium weighs ⅓ less than aluminum, so they are easier to handle.

But more importantly, the accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges assure more exacting work.



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New sides or ends may be easily inserted because of the precision machined and drilled, bolted corner construction. It is no longer necessary to scrap entire jackets. The standard style is designed for ordinary foundry practice, while the grooved style, which permits ready gas escape, is ideal for steel foundries. Flasks and jackets can be assembled on 3°, 4° or 5° taper.

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EASY TO USE

A new rectangular-shaped briquet for stacking and shipping on pallets is now produced by ELECTROMET. Pallet shipments are convenient and economical to handle. The pallets hold approximately 4,000 lb. of "EM" silicon briquets and are available at no extra charge over bulk shipments. They can easily be unloaded and handled in your plant by lift truck or overhead crane. Handling time and costs are reduced and inventory-taking is simplified. The pallets are expendable and need not be returned.

"EM" palletized silicon briquets are 6 in. x 3 in. x 2 in. in size, weigh 5 lb. gross, and contain 2 lb. of silicon. The briquets are notched, so that they can easily be split in half when 1 lb. additions of silicon are desired. Because they contain an exact amount of silicon, these briquets offer close control of analysis in cupola melting operations.

Phone, wire, or write the nearest ELECTROMET office listed below for further information on how you can save with palletized silicon briquets.

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Ordinary chilled iron abrasives have two disadvantages that cost you a lot of money; 1., being hard, they're brittle, resulting in a rapid breakdown and high abrasive consumption per pound or piece of work processed; and 2., the high hardness produces high maintenance costs. Would you be interested in a rose *WITHOUT* these thorns?

Controlled "T" shot and grit are chilled iron abrasives in which the iron carbides (that do the cutting) are imbedded in a ductile matrix—this shot actually deforms before tearing apart. Controlled "T" shot and grit are held to a hardness range below 450 BHN—the wearing parts of your cleaning equipment usually have a hardness range of from 450 to 550 BHN. Controlled "T" cuts as fast (or faster), lasts longer and is easier on your equipment.

Controlled "T" shot and grit may sell for as much as $10 to $20 more per ton, yet we make you this straightforward guarantee: Your cleaning costs (or abrasive costs alone, if you prefer) will be 15% less, regardless of the price you may be paying now for your chilled iron abrasives. Fair enough? The worst that can happen to you on such a test is a 15% saving. Write, wire or phone the nearest Hickman, Williams office.

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Information

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Metal at Work

"Metal at Work," 88-page, colorful publication of Continental Copper & Steel Industries, Inc., describes and illustrates operations and products of the company's Niagara Falls Smelting

& Refining Div. and six other divisions. Listed are some 50 alloys and materials for foundry use. The book is highlighted with full-color illustrations of product applications and a large number of technical photographs.

For more data, circle No. 53 on card on p. 18

Floor Trucks

Booklet 53-S is now available. This literature, of handy pocket size, yet large enough and substantial enough not to go astray in standard files, illustrates 32 different types of trucks for easier and safer materials handlings. The specifications and descriptions of these trucks, available in numerous standard sizes, include pertinent product data. *Nutting Truck and Caster Co.*

For more data, circle No. 54 on card on p. 18

Sand Tempering

A folder describing automatic sand tempering and control equipment is now available. Folder lists specifications of the various units by weight, base, height, air and power. *Harry W. Dietert Co.*

For more data, circle No. 55 on card on p. 18

New England

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vidual players. His degree in philosophy from the University of Providence has provided an interesting background for the newest major league manager.

Martin Pepper, Whitehead Bros., New York, opened the sessions on October 24 with a paper on "Sand Control in Relation to Casting Finishes." The meeting was under the chairmanship of W. N. Ohlson, Draper Corp., Hopedale, Mass., assisted by G. A. Pinkul, General Electric Co., Lynn, Mass.

Mr. Pepper cautioned the audience to select base sand carefully with respect to grain distribution. Establish the properties you need he stated, then exercise careful control. Test equipment is more necessary for synthetic sands, Mr. Pepper said. He compared the relative merits of natural and synthetic sands. Although naturals are more flexible from the standpoint of finish, and require less mechanization, the synthetics have an important advantage in needing less control by the molder. The latter point is especially important with a short supply of skilled labor.

If the foundryman spends as much time on his sands as he does on new precision molding methods, his results will be good, Pepper continued. And, having determined the best properties for a given casting: flowability, grain size, permeability, and hot strength—only close control will guarantee uniform results.

Quality control in the small foundry was the subject taken by W. J. Sommer, Plainville Casting Co., Plainville, Conn. Forrest Scott, Narragansett Gray Iron Foundry Co., Providence, Rhode Island, was chairman; and William Hale, Springfield Foundry Co., Springfield, Mass., the co-chairman.

Elaborate controls in an industry becoming increasingly quality conscious, need not deter the small foundry, Mr. Sommer said. One man must be responsible for quality control in the small plant, whether he be the metallurgist, melting foreman, or inspector.

Mr. Sommer thought the scrap pile was the best starting point, with an accurate accounting made of all scrap castings and the reason for their reject. He expressed the opinion that moisture, permeability, and green compression tests are sufficient for sand control. A procedure was outlined through all departments: pattern, core room, molding, melting, pouring cleaning, and inspiration. If the duties of the various foremen are detailed, various sand and metal test limits established, and records of operation kept in good order, the quality control man may well become only a trouble shooter, declared Sommer.

W. D. Stewart, Aluminum Co. of America, Pittsburgh, Pa., next discussed "Aluminum Sand Foundry Practice." He was introduced by Chairman F. G. Volpe, Somerville Machine & Foundry Co., Somerville, Mass. Co-chairman was J. S. Barros, And-Bar Non-Ferrous Foundry, Taunton, Mass.

Mr. Stewart referred the audience to the November, 1951, issue of AMERICAN FOUNDRYMAN for a complete coverage of aluminum foundry techniques. He said that characteristics of the alloys determine foundry practice, and that individual properties must be considered. Stewart reviewed briefly such topics as melting, sands, gating, risering, cleaning, heat treating, and the use of various tests for production control.

Efficient cupola operation was the central theme of a paper by Daniel E. Krause Gray Iron Research Institute, Columbus, Ohio. J. B. Stazinski, General Electric Co., Everett, Mass., was

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1. Automatic Sand Tempering Unit

Automatically insures correctly tempered sand at the molders' hopper.

Measures exact moisture in return sand and adds required water to bring sand to temper.

Measures temperature of return sand and adds evaporation water required.

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Automatically fills sand hoppers and bins by controlling plow action.

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- **MEXADIP STAYS IN SUSPENSION.** Let it stand over the week end, it will be ready to go Monday morning.

- **MEXADIP WILL NOT RUN, BUILD UP OR RUB OFF.** It applies equally well on either green or baked cores.

- **MEXADIP IS DEPENDABLE AT ANY BAUME.** It is applied daily to cores for thousands of tons of castings over a range of 10-40 degrees Baume.

- **MEXADIP REQUIRES NO LONG "PASTE" MIXING.** No waiting period is necessary. Just add the powder to water and after a few minutes of stirring it is ready to go.

IMPROVE CASTING APPEARANCE AND SAVE MAN HOURS IN THE CLEANING ROOM. If you have a problem with core wash, MEXADIP will solve it. Ask us to arrange a test today.

Why wait . . .
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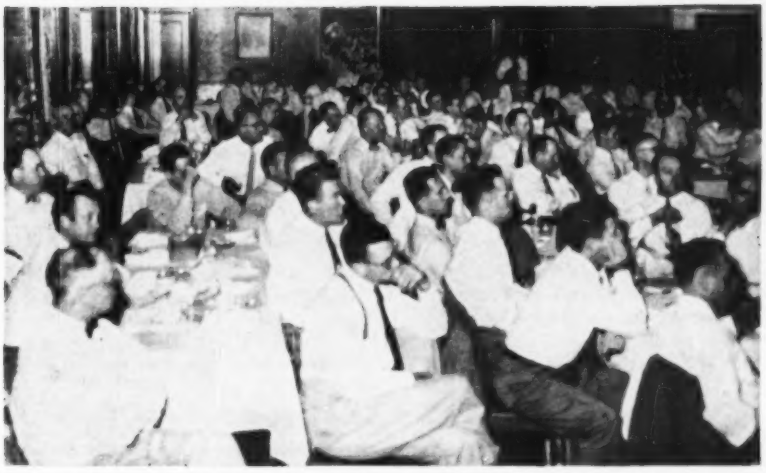

Part of the capacity crowd at the September meeting of the St. Louis District Chapter, which featured a symposium on shell molding.

Chapter News

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test for measuring the green properties of core mixtures.

Mr. Wilcox told the pattern group that northern white pine is a preferred lumber for pattern making because it is easily workable and has little pitch.

He described various tests used to determine moisture content in raw lumber. Measurements of weight before and after baking are accurate but require too much time. Electrical conductivity gives an instantaneous reading with comparable accuracy.

Wilcox outlined treatment processes for pattern purposes and passed out charts and samples to show the effect of improper aging and shrinkage. Robert Hendry, Love Bros., was chairman at this session.

Mr. Rich pointed out to the maintenance and steel group that improvements have been made in the cleaning of large castings and high production of small and medium castings has been accomplished. Alloy liners, he said, while much more expensive than mild steel will last considerably longer and are cheaper in the long run. His talk was accompanied with slides. The solution to the blast cleaning problem is continued cooperation between the manufacturers of equipment and the engineers of the users, Mr. Gardner pointed out at the same session. Daily inspection of parts, he declared, is important to keep "down time" to a minimum. He also accompanied his talk with slides. Chairman for the session was Harold Reckart, National Malleable & Steel Castings Co.

Central Ohio

ELDON BONER
Cooper Bessmer Corp.

At a meeting of the Board of Central Ohio Chapter, October 12, Karl Presser, Gray Iron Research Institute, Columbus, Ohio, was appointed to fill the unexpired term of T. M. Cusack, O. S. Kelley Co., treasurer. J. McConnell, Globe Steel Abrasives Co., Mansfield, Ohio, was appointed to fill the unexpired term of Mr. Presser as director. Mr. Presser was the main speaker at the regular meeting. His subject was *"What Quality Control Means to a Foundry Foreman."* Too often foundry supervisors shy away from quality control because they feel it means high power mathematics, he pointed out. However, he declared, quality control means basically, getting better castings and less scrap.

Ontario

PETER J. PROVIAS
Cockshutt Farm Equipment, Ltd.

A group of 175 members and guests of the Ontario Chapter attended the opening meeting held October 30 at the Royal Connaught Hotel, Hamilton, Ontario. The meeting featured a top management and sister societies theme with the highlight being the guest speaker, Past AFS President, Walter L. Seelback, Superior Foundry, Inc. He pointed out what AFS was doing for industry and stated that its aims and purposes were to keep industry progressive and well informed. G. Ewing Tait, Dominion Engineering, Montreal, Quebec, spoke briefly as a National Director of AFS on his first visit to the Ontario Chapter.

N. Illinois—S. Wisconsin

CARL L. DAHLQUIST
Greenlee Bros. & Co.

Lyle Clark, Armour Institute of Technology, Chicago, spoke at the dinner meeting of the Northern Illinois and Southern Wisconsin Chapter at Hotel Freeport, Freeport, Ill., October 13. His subject was *"Cupola Operation."* Referring to coke, Mr. Clarke told about a Michigan foundry employing a gyratory screen using all coke in its cupolas that did not pass the 2 in. mesh; selling the coke that went through the screen to the employees. With increased cupola stack permeability thus obtained, he pointed out, the iron melted faster from 8.1 tons per hour to 10.5 tons per hour. Smaller coke is expensive, he declared, when one considers that more blast is required and a lower melting yield is obtained.

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Soft ball was one of the many sports enjoyed by members and their guests at the annual outing of the Philadelphia Chapter.

New England

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session chairman, aided by co-chairman K. B. Hapgood, Hunt-Spiller Mfg. Corp., South Boston, Mass.

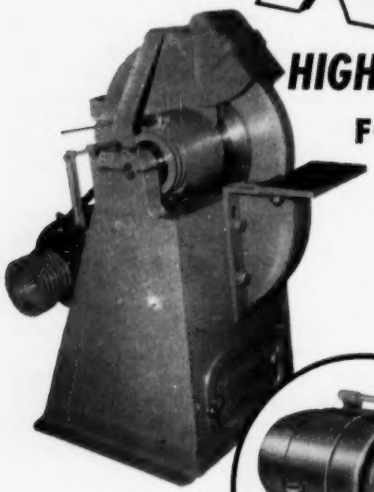
Mr. Krause detailed the most advanced thinking in cupola practice, looking toward a minimum downtime.

Final technical session featured W. B. George, R. Lavin and Sons, Inc., Chicago, who discussed why castings are lost. Gates, he said, must be designed as integral parts of the casting for true soundness and minimum loss. Using a series of chalk sketches, Mr. George illustrated his points effectively. Lack of understanding of metal solidification patterns is a prime cause for high loss rates, he declared. Other factors he listed as improper gating and spruing, and faulty pouring.

The Conference was closed with a visit to the M.I.T. foundry in Sloan Metal Processing Laboratory, where students demonstrated shell molding machinery. This feature was conducted by the Institute, in conjunction with Production Pattern and Foundry Co.

FOX

HIGH-SPEED STAND GRINDERS



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Three important reasons why FOX Grinders are designed as single-wheel machines:

1. Speed changes can be made at the proper wheel diameter.
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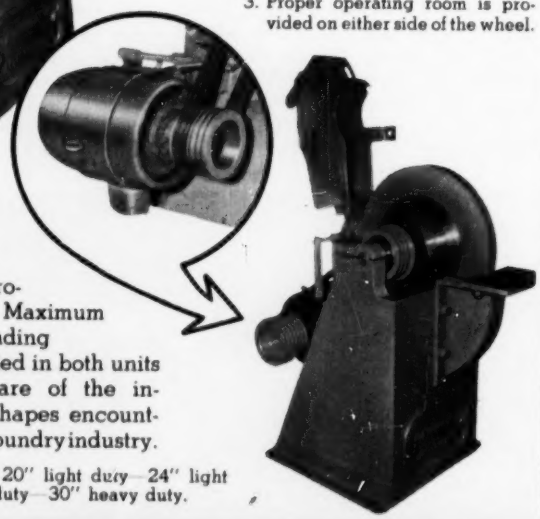

These Stand Grinders have been designed for use in foundries where high-speed production is required. Maximum clearance at the grinding face has been provided in both units to properly take care of the innumerable casting shapes encountered throughout the foundry industry.

Comes in 4 sizes: 20" light duty—24" light duty—24" heavy duty—30" heavy duty.

FOX GRINDERS, Inc.

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Headquarters

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***McBride, Robert J.; McBride Pattern Works; Longview, Texas**

***Meehanite Metal Corp.; New Rochelle, N. Y.**

Michigan Oven Co., Detroit

Miller & Co., Chicago

***Northern Malleable Iron Co.; St. Paul, Minn.**

Pelton Steel Casting Co., Milwaukee

***Pennsylvania Foundry Supply & Sand Co., Philadelphia**

***Racine Aluminum & Brass Foundry; Racine, Wis.**

Rimser, George; Prescott Brass Ltd.; Prescott, Ont., Can.

***Sheridan, Philip J.; Hickman, Williams & Co.; Brighton, N. Y.**

***Shriver & Co., Inc.; T.; Harrison, N. J.**

Sivyer Steel Casting Co., Milwaukee

Sterling Steel Casting Co.; East St. Louis, Ill.

Thomas Foundries, Inc.; Birmingham, Ala.

Tower Grove Foundry; Div., Laclede Stoker Co., St. Louis

***Wehr Steel Co., Milwaukee**

Welland Iron & Brass, Ltd.; Welland, Ont., Can.

Youngstown Foundry & Machine Co.; Youngstown, Ohio

New Government Publications

The U.S. Department of Commerce has announced the publication of two booklets of interest to foundrymen. The first, *Advanced Casting Techniques and Processes*, PB 109239, provides valuable information on the casting of high-temperature alloys into ceramic molds. The release claims that the new technique will produce more accurate molds, and show considerable materials savings.

The Cause of Porosity and Leakage in Non-Ferrous Castings, PB 109257, contains the results of experiments at the Naval Research Laboratory on high-pressure bronze castings, which can be made leakproof with no intercrystalline shrinkage. Either publication can be ordered from Publication Board Project, Library of Congress.

Michigan

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introduced Vic Crosby, Climax Molybdenum Co., who entertained the diners with his biting southern wit. Several acts by professional entertainers followed. The steak dinner was prepared by students studying hotel management at Kellogg Center.

Plastics for Core Dryers

"Plastic Core Dryers" was the subject of A. E. Jacobson, Jr., Grand Haven Brass Foundry Co. He was introduced by Chairman K. H. Priestley, Vassar Electroloy Products Co. Plastic dryers, as now made, will stand only about 300 F, Jacobson said. However, the government has been developing new plastics for this use that will withstand up to 1000 F, but they are not yet available to industry.

Mr. Jacobson detailed the various types of dryers now used in dielectric ovens, said that plastic dryers are more expensive than aluminum. Their advantages will offset the cost, he asserted. Polyester resin, mixed with fiber glass and clay filler is pressed and baked to form an excellent dryer. This is the same plastic used in making the new automobile bodies, and has great strength. Despite their advantages, Jacobson cautioned that plastic dryers are not yet right for fully automatic core making, and that they are expensive. Thermal expansion of plastics in ovens is bad, requiring pre-heating to rectify the situation.

In the following session, Charles Smith, Plastic Tool Co. of America, took as his topic, "Application of Phenolic Polyester and Epoxy Resin in Making Patterns." E. J. Passman, Frederic B. Stevens Co., presided.

Mr. Smith stated plastics are no cure-all in the foundry. Polyester-fiber glass combinations have been applied to pattern making, but substitution of epoxy with glass seemed to produce better results. Low cost duplicating with extremely light weight and speed of delivery have resulted.

Fred J. Hodgson, student at Michigan State College, and an F. E. F. scholar, described his work in plastic patterns at Saginaw Malleable Division. This project was an extension of his studies in foundry at the college.

With P. W. Olson, Eaton Mfg. Co., acting as chairman, the next session featured F. J. McDonald, Saginaw Malleable Iron Division. Mr. McDonald presented a paper on "Gat-

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TO OUR FRIENDS and CLIENTS in the FOUNDRY INDUSTRY

Many companies whose fiscal year began since the end of the Korean War are experiencing their first year of operation under relatively normal business conditions.

With the exception of the brief interim after World War II present day foundrymen have operated for almost 20 years of war, depression and post war abnormalities. *Consequently, this year and those ahead will present a challenge which only the more progressive will be prepared to meet.*

Although the outlook for the foundry industry is encouraging, it is obvious that the lion's share of the foundry market will go to those who have *the tools for measuring output and pricing their product accurately. No slipshod "guesstimating" for them — not when every order counts.* What "tools" do they use? MEASURED WORK STANDARDS — *of course!*

As one of the leading firms of foundry specialists in the country we are equipped to develop work standards for a single operation or a complete program. Why not let us tell you about our service?

Sincerely,

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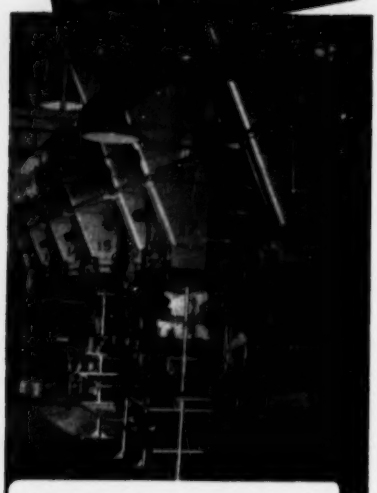

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Michigan

continued from page 117

ing to Control Pouring Rate and Its Effect on Castings." This paper is printed in full on pages 36-41 of this issue of AMERICAN FOUNDRYMAN.

Charles Yaker, Precision Casting Div., Michigan Steel Casting Co., then presented his paper: "Introduction of Precision Molding for Investment Casting." Roland Banister, Midwest Foundry Div., L. A. Darling Co., occupied the chair for the session.

The heavy demand for precision parts of heat resistant alloys for use in the aircraft gas turbine field has resulted in rapid growth of the investment casting industry, Mr. Yaker said. This development, however, has been paralleled with rapid expansion in the use of investment cast parts in many industrial applications. Yaker then described the processing of a typical mass-produced steel or heat-resistant alloy casting. He concluded by outlining the applications, limitations, and future field for investment castings.

Round Table Series

Three round table luncheons were held simultaneously on the second day of the Conference. The non-ferrous luncheon was presided over by M. E. Brooks, Dow Chemical Co. His panel consisted of F. S. Brewster, Harry W. Dietert Co.; A. E. Jacobson, Jr., Grand Haven Brass Foundry Co.; and A. T. Peters, Dow Chemical Co. They discussed questions asked from the floor in connection with non-ferrous foundry operations.

F. B. Rote, Albion Malleable Iron Co., presided at the malleable round table. He was assisted by M. E. Roe, Archer-Daniels-Midland Co.; Theodore Redin, William Demmler & Bros.; and R. A. Flynn, University of Michigan. New molding process techniques, their advantages and limitations, was the general subject. Three broad topics: D-process, C-process, and blown green sand molds—were discussed by Messrs. Roe, Flynn, and Redin.

Richard Schneidewind, University of Michigan, was chairman of the gray iron round table discussions. His panel included O. J. Myers, Archer-Daniels-Midland Co.; R. B. Melmoth, Ford Motor Co.; and L. D. Pridmore, International Molding Machine Co. Hypothetical patterns were set up on a black board and then discussed from the floor. Questions were directed at panel members, who replied from the podium.

Following the round table discussions, the AFS motion picture on gating design was shown, and the equipment used in the film was demonstrated, under the direction of Prof. C. A. Sigerfoos, Michigan State College. The college foundry was opened for inspection after the final session.

Student Sessions

On Friday, October 9, a separate student session was conducted, under the chairmanship of H. A. Deane, Campbell, Wyant & Cannon Foundry Co. It was designed to acquaint students of Michigan State College and University of Michigan with the cast metals industry as a profession. Mr. Deane opened the session by welcoming the 100 students, then introduced F. J. Walls, International Nickel Co., who served as toastmaster.

E. J. Walsh, Foundry Educational Foundation, told the students how his organization could aid them in choosing a career. He noted the progress made in colleges and universities in preparing young men for careers in the foundry.

Following lunch, Mr. Walls introduced Wm. W. Maloney, AFS Secretary-Treasurer, who mentioned the program the Society is considering for secondary schools, and how it would be administered by local chapters and their respective educational committees. He referred also to the plan for AFS to retain a full-time educational director in the near future to help coordinate such programs at the secondary and vocational school levels.

Dean of Engineering Speaks

C. J. Freund, dean of engineering, University of Detroit, told the students "How to Prepare for a Foundry Career." He summarized the major steps: get a summer job in an up-to-date foundry; apply for an F.E.F. scholarship; study all the mathematics, physics, chemistry, and other sciences possible; include some business administration.

Final speaker at the student session was John Stearling, Cleveland Div., Ford Motor Co., whose topic was "Young Men in the Foundry Industry." He pointed out that automation would not deprive men of their jobs, but would help develop the techniques needed in today's progressive industry.

Mr. Stearling's basic themes were: that the foundry is as good a place to work as any industry; and that scientific methods offer a never-ending challenge to the trained individual. He concluded his talk with a showing of a film, "Technique For Tomorrow," which illustrated how a worker can train on the job for a successful career.

Purdue

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Michigan State machine shop laboratory, and showed how their behavior was similar to that of the test castings reported by Sanders. A 10-in. flywheel weighing 20 lb showed shrinkage in a blind riser when cast in green sand but no shrink when poured in a core. In pouring 4-in. cube test castings, similar results were obtained, he said, and in addition, when core molds were not confined by a flask, castings made in them also exhibited shrinkage similar to green sand.

Small air-compressor crankshafts poured in shell molds exhibited shrinkage regardless of the backing used, said Prof. Sigerfoos. When the same pattern was used for dry sand molds, the castings did not shrink. He attributed the difference to mold wall movement.

Prof. C. T. Marek, conference co-chairman, closed the conference with a tribute to V. S. Spears, American Wheelabrator & Equipment Corp., program chairman, and Mr. Lentz, assistant program chairman.

In addition to Messrs. Barrett, Marek, Spears, and Lentz, the Conference Committee consisted of: L. M. Essex, Golden Foundry; R. H. Greenlee, Auto Specialties Mfg. Co.; L. D. Kirkman, Harrison Steel Casting Co.; Mr. Kauffman; E. G. Richardson, Delco Remy Div., General Motors Corp.; Prof. Lindley; Prof. Bolz; and M. M. McClure, Purdue University.

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Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of AMERICAN FOUNDRYMAN, published monthly at Chicago, Ill., for October 1, 1953. 1—The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.; Editor, Wm. W. Maloney, 616 S. Michigan Ave., Chicago 5, Ill.; Managing Editor, H. J. Wheelock, 616 S. Michigan Ave., Chicago 5, Ill.; Business Manager, none; 2—The owner is: American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill., organized not for profit, without stock. Principal officers: President, Collins L. Carter, Albion Malleable Iron Co., Albion, Mich.; Vice-President, F. J. Dost, Sterling Foundry Co., Wellington, Ohio; Secretary-Treasurer, Wm. W. Maloney, American Foundrymen's Society, Chicago 5, Ill. 3—The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: none. 4—Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. H. J. Wheelock, managing editor. Sworn to and subscribed before me this 28th day of September 1953. (Seal). E. R. May, notary public. (My commission expires March 14, 1956.)

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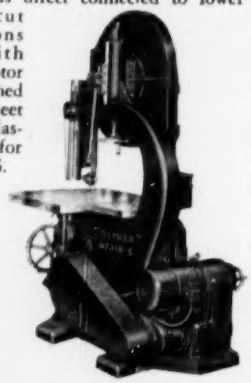

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Louis Dill, George F. Pettinos, Inc., points the way at the Annual outing and picnic of the Philadelphia Chapter.

Chapter News

continued from page 115

Washington

The Washington Chapter held its first meeting of the new season at the Stewart Hotel, Seattle. William N. Davis of the National Office was guest speaker. His subject was *"Safety, Hygiene and Air Pollution."*

Mo. School of Mines

ROBERT SKAGGS

The Missouri School of Mines student chapters of AFS and A.S.M. held their annual joint meeting September 30. The admitted purpose of the meeting was that of luring freshmen and undeclared upper classmen into the field of metallurgy. Doctor Schlechten, chairman of the metallurgy department, introduced the members of his department before turning the meeting over to Ralph Hollocher, AFS Student Chapter president and Tony Salvaggi, A.S.M. Chapter president. Dean Curtis L. Wilson of the School of Mines was the guest speaker for the evening. His subject was *"The Future of Metallurgy."* He named four approaches to the future: exploration, substitution for scarce metals, conservation and technology. Of the four, Dean Wilson pointed out that he considered technology the most important. The Dean declared that the foundry, once a place for men wide in the shoulders and narrow between the ears, has responded to modern developments, and is now the most promising field of employment for the metallurgical engineer.

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Chapter Meetings

December

1 . . Rochester

Seneca Hotel, Rochester, N. Y. Ray Olson, Production Pattern & Foundry Co., *"Patterns for Shell Molding."*

3 . . Canton District

Barberton Elks Club, Barberton, Ohio. William S. Pellini, Naval Research Laboratory, *"Application of Chills to Increase Feeding Range of Risers."*

3 . . Saginaw Valley

Fischer's Hotel, Frankenmuth, Mich. W. N. Davis, AFS National Office, J. Kane, American Air Filter Co., and H. T. Walworth, Lumberman's Mutual Casualty Co., *"Safety, Hygiene, and Air Pollution Panel."*

4 . . Mo-Kan

President Hotel, Kansas City, Mo. Annual Christmas Party.

4 . . Central Michigan

Hart Hotel, Battle Creek, Mich. Christmas Dance and Dinner.

7 . . Central Indiana

Athenaeum, Indianapolis. Ted Glaza, Crane Co., *"Sand System Maintenance."*

7 . . Western Michigan

Cottage Inn, Muskegon, Mich. Tom Barlow, Eastern Clay Products, *"High Pressure Molding."*

7 . . Chicago

Chicago Bar Association, Chicago. Round Table. Gray Iron, Malleable, Lyle Clark, Armour Research Foundation, *"Cupola Control."* Steel, Panel Discussion. Maintenance, Shakeout Operation. Non-Ferrous Patterns, Peder Moluf, Dow Chemical Co., *"Use of Magnesium for Patterns and Core Boxes."*

10 . . Northeastern Ohio

Tudor Arms Hotel, Cleveland. Christmas Party.

11 . . Metropolitan

Essex House, Newark, N. J. Annual Christmas Party.

11 . . Wisconsin

Hotel Schroeder, Milwaukee. Annual Christmas Party.

11 . . Ontario

Plant visit to Steel Co. of Canada, Hamilton Works, Wilcox St.

14 . . Michigan

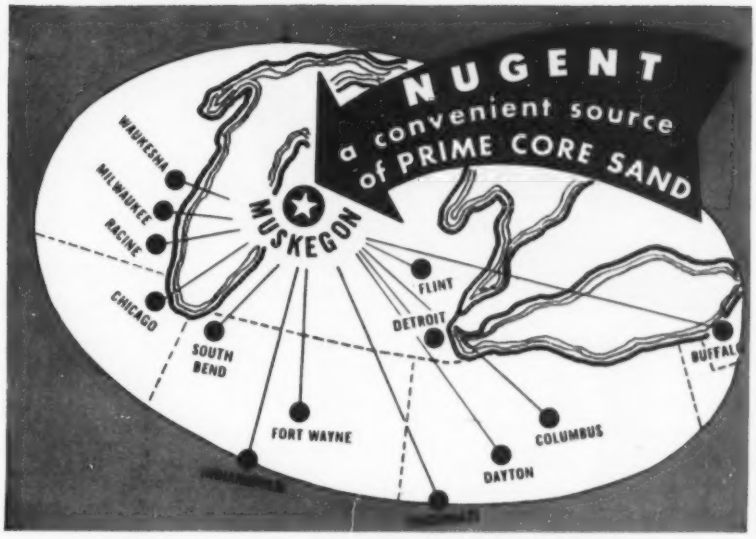
Morris Park Country Club, South Bend, Ind. R. W. Gardner, Dearborn Iron Foundry, Ford Motor Co., *"Practical Quality Control."*

15 . . Twin City

Nicollet Hotel, Minneapolis, Minn. Annual Christmas Party.

18 . . Oregon

Heathman Hotel, Portland, Oregon, Annual Christmas Party.



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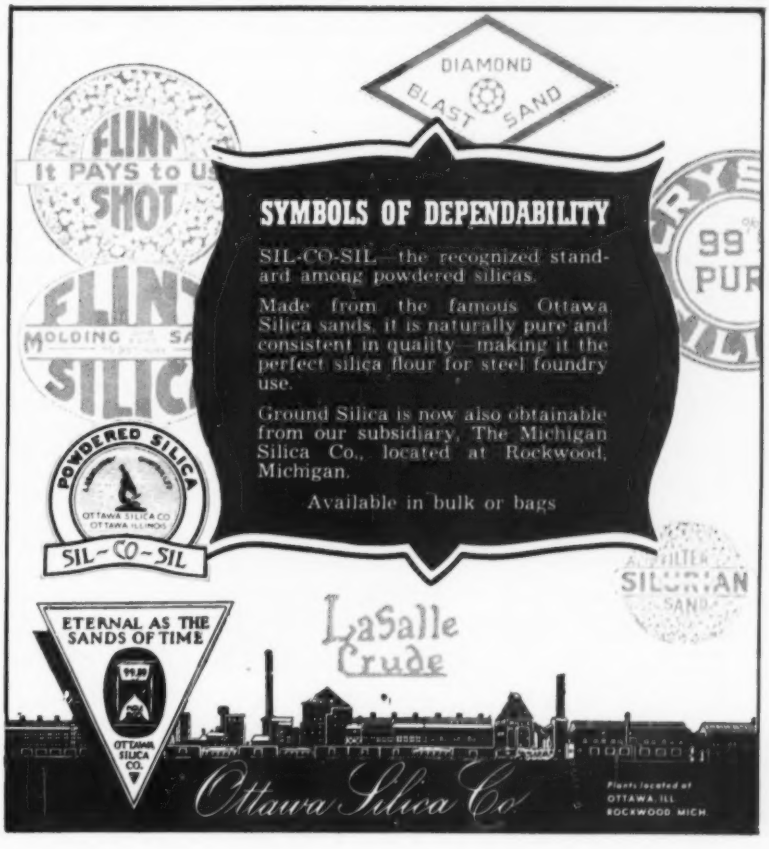
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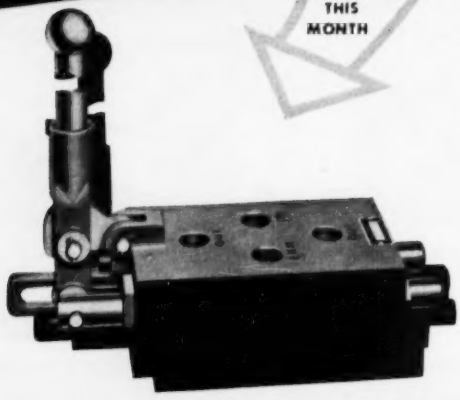

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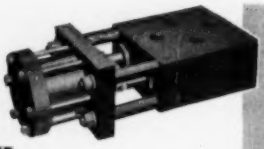

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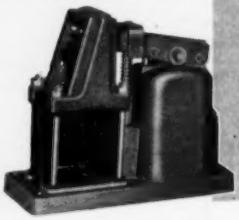

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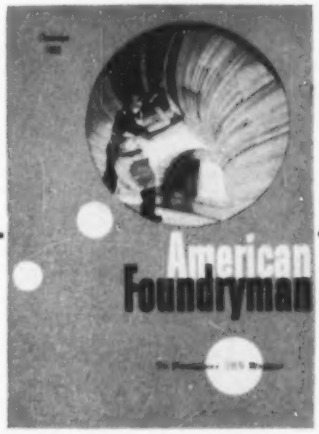

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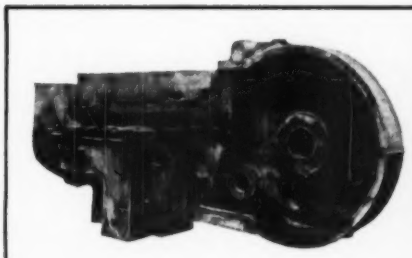
These are a few of the many reasons why Waterbury Farrel uses INDUCTOL in their core mix. In addition they gain the benefits of easy mixing and excellent workability. INDUCTOL, too, forms noticeably less gas than conventional core oils, and it is non-toxic.

Perhaps INDUCTOL can answer some of your core-making problems. Write for details and samples, or call your LINOIL man.



It takes 2½ days to complete this 6-ton grey iron casting, the frame for a Waterbury Farrel screw thread roller.

Snagging rough casting of a 5½-ton frame for a cam eyelet machine.

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write for details on the ADM line of foundry products:

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